Alternatives Analysis/Draft Environmental Impact Statement

for the

QUEENS SUBWAY OPTIONS STUDY

Borough of Queens
New York, New York

May 1984

U.S. Department of Transportation
Urban Mass Transportation Administration

Metropolitan Transportation Authority
State of New York

ALTERNATIVES ANALYSIS/DRAFT ENVIRONMENTAL IMPACT STATEMENT

for the

QUEENS SUBWAY OPTIONS STUDY

in

BOROUGH OF QUEENS
NEW YORK CITY, NEW YORK

prepared by

U.S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

and

METROPOLITAN TRANSPORTATION AUTHORITY
STATE OF NEW YORK

DRAFT ENVIRONMENTAL IMPACT STATEMENT
PURSUANT TO THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

DATE: 4/27/84

FOR UMTA: Hiram J. Walker

Hiram J. Walker,
Deputy Regional Administrator
Region 2

DATE: 4-23-84

FOR MTA: Robert R. Kiley

Robert R. Kiley
Chairman

COVER SHEET

U.S. DEPARTMENT OF TRANSPORTATION

URBAN MASS TRANSPORTATION ADMINISTRATION

DRAFT ENVIRONMENTAL IMPACT STATEMENT

ALTERNATIVES ANALYSIS

Pursuant to Section 102(2) (c), of the National Environmental Policy Act of 1969, and the Urban Mass Transportation Act of 1964, as amended.

RESPONSIBLE AGENICES:

Lead Agencies - Urban Mass Transportation Administration
Metropolitan Transportation Authority

TITLE OF PROPOSED ACTION:

Queens Subway Options Study, Queens
New York City, New York

ABSTRACT:

This document describes and summarizes the environmental impact analysis and comparative evaluation of alternatives being considered to relieve overcrowding on the E and F lines and other improvements of transit service in the Borough of Queens, New York. Four build alternatives and a no additional construction option are being considered. The five alternatives exhibit marked differences in extent of new service, costs and some environmental consequences.

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Comments on this AA/DEIS are due by July 3, 1984 and should be sent to Mr. Brian P. Sterman at the above address.

PREFACE

This Alternatives Analysis/Draft Environmental Impact Statement for the Queens Subway Options Study has been prepared in compliance with applicable federal, state and local requirements. Its purpose is to provide information that will enable interested citizens, organizations, elected officials and government agencies to make informed choices among options for improvement of subway service for the Borough of Queens, New York. Five alternatives are considered. The alternatives encompass a wide range of service patterns and exhibit marked differences in capital and operating costs, and environmental consequences. This document describes and summarizes the findings of the Queens Subway Options Study, which encompasses the environmental impact analysis and comparative evaluation of the alternatives being considered for the Queens transit improvements.

QUEENS SUBWAY OPTIONS STUDY
DRAFT ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

DRAFT ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

DRAFT ENVIRONMENTAL IMPACT STATEMENT

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

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LIST OF TABLES
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LIST OF TABLES
(continued)

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LIST OF FIGURES

LIST OF FIGURES
(Continued)

ERRATA SHEET

Table 5-1: Peak Hour Passengers at 53rd Street Tunnel for the Queens Boulevard Line Local Connection should read 48,900, not 35,200

Page A.2-1: Under Queens Borough Public Library Branches add the following branches:

Baisley Park 117-11 Sutphin Boulevard, Jamaica
Briarwood 138-12 84 Road
Corona 38-23 104 Street
E. Elmhurst 95-06 156 Avenue
Langston Hughes Community Library & Cultural Center
102-09 Northern Boulevard
Lefferts 103-34 Lefferts Boulevard
North Forest Hills 98-27 Metropolitan Avenue
Ozone Park 92-24 Rockaway Boulevard
Pomonok 158-21 Jewel Avenue
Queensbridge 10-43 41 Avenue, Long Island City
Howard Beach 92-06 156 Avenue

SUMMARY

This Draft Environmental Impact Statement (DEIS) has been prepared in compliance with applicable federal, state, and local requirements. Its purpose is to provide information that will enable interested citizens, organizations, elected officials, and government agencies to make informed choices among options for improvement of subway service for the borough of Queens, New York. This document describes and summarizes the findings of the Queens Subway Options Study initiated in 1982 which encompasses an environmental impact analysis and comparative evaluation of the alternatives being considered for the Queens transit improvements.

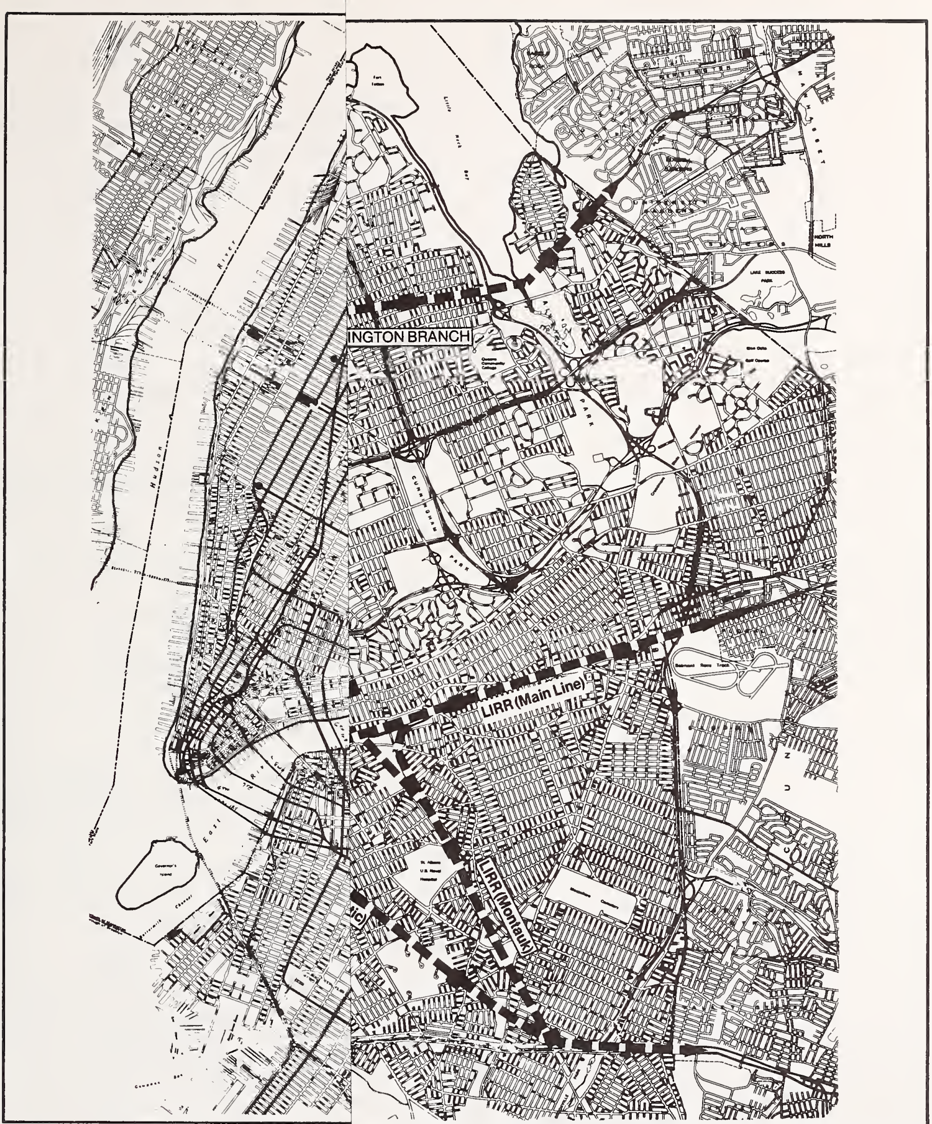
S.1 Need for Action

Queens is the largest of the New York City boroughs in land area (115 square miles) and the second largest in population (1.9 million). It occupies a key position in the geographic and economic structure of New York City and the New York metropolitan region. Like the rest of the region, journey-to-work trips from Queens are heavily oriented towards Manhattan destinations. Similarly, the level of transit usage reflects the region's overall dependence on mass transit services for moving its work force into the intensely developed Central Business District of Manhattan. While the New York Subway system is the most extensive in the nation, expansion of service has not kept pace with the needs generated by growth in certain areas of the City, particularly the accelerated population growth experienced by Queens in the post-war decades. Since 1940, while New York City's overall population declined slightly, the population of Queens increased by 45 percent from 1.3 million to 1.9 million.

The Borough of Queens is centrally located in the Manhattan-Queens-Long Island corridor and features a range of rapid transit, railroad, and bus services, all heavily traveled. As shown in Figure S-1, the general orientation of the Queens subway lines and the Long Island Rail Road is east-west, carrying trips to and from Manhattan. Despite declines over the past decade in overall subway system ridership, the high concentration of employment in Manhattan causes peak-hour demand to remain high. The existing subway lines from Queens utilize East River crossings at 60th Street, 53rd Street, and 42nd Street in Manhattan. These tunnels carry a total of 127,200 passengers in the AM peak hour.

The 60th Street Tunnel, used by the RR and N lines, feeds into Manhattan's BMT line running down Broadway. This service is slow and does not bring workers directly to the Midtown office area which lies east of Sixth Avenue. The 53rd Street Tunnel, carrying E and F express trains from the Queens Boulevard line, cuts through the heart of the Midtown office district along 53rd Street, stops at Lexington and Fifth Avenues, and then feeds into the Sixth and Eighth Avenue IND lines. The F train runs along Sixth Avenue, a major office corridor. The E train travels down Eighth Avenue to the World Trade Center, serving the west side of Midtown and lower Manhattan.

These Queens-Manhattan lines are all heavily used, particularly the E and F lines which are the most crowded lines in the system. The Queens Boulevard

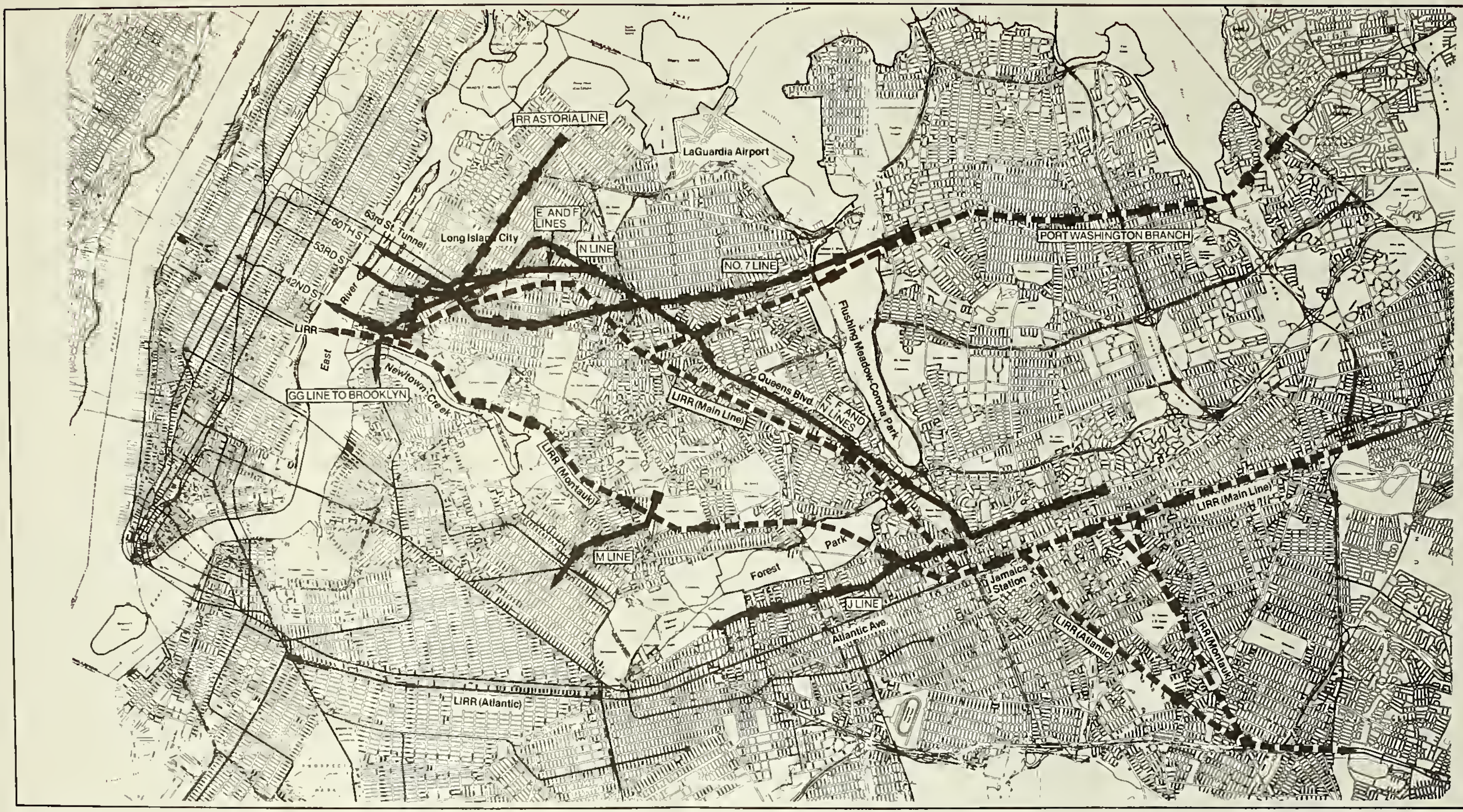


Legend
Subway Lines
Stations
LIRR Lines

0 6000
Scale in Feet
N

EXISTING TRANSIT SERVICE IN QUEENS

Figure S-1



Legend
Subway Lines
Stations
LIRR Lines

0 6000
Scale in Feet
N

EXISTING TRANSIT SERVICE IN QUEENS

Figure S-1

Express E and F subway lines carry an AM peak hour volume of 55,000 trips, which translates into operational loadings exceeding 100 percent of passenger capacity. None of the other rapid transit crossings exceed 40,000.

The need for increased capacity and expansion of subway service in Queens is indicated by:

- Severe overcrowding on the Queens Boulevard express line (E and F service). Peak hour loadings on these lines average over 232 passengers per car on equipment with a practical capacity of 220 passengers.

- Lack of access to the system from many areas of the borough.

- Lengthy travel times to Manhattan business districts from the outer areas.

The primary transportation goals of the project have been dictated by the transit improvement needs summarized above. The primary goals of the project are to:

- Relieve overcrowding on the Queens Boulevard subway line (E and F trains).

- Improve accessibility to rail transit services in Queens.

- Accommodate growth in ridership in the Queens/Long Island corridor, particularly at rush hour.

- Provide improved subway travel times for existing riders.

Operational goals for the Queens transit project include the effective utilization of the new East River Tunnel crossing to 63rd Street in Manhattan and the soon to be completed Archer Avenue subway connections in Jamaica.

Evaluation of the alternatives also considers non-transportation goals which are important in selection of a preferred alternative:

- Enhance the relationship and minimize conflicts between the transportation system and the socioeconomic, physical, and natural environment.

- Provide service which is economical and cost effective to construct and operate.

- Maximize the probability of the preferred alternative being implemented.

The stated transportation and non-transportation goals provide the framework for evaluation of the five project alternatives identified below.

S.2 The Planning and Project Development Process

In 1976, the Urban Mass Transportation Administration (UMTA) promulgated a policy requiring alternatives analysis studies prior to commitment of federal funds for major mass transportation capital investments. The Queens Subway Options Study represents the detailed analysis of that process. An earlier study, the Queens Transit Alternatives Study, narrowed the choice of alternatives to five candidates. The process has involved reevaluation of a construction program launched by Metropolitan Transportation Administration (MTA) in 1968, calling for new subway routes in Queens and other boroughs of New York City. Sharply rising costs and greatly reduced availability of funds over the past fifteen years have made full implementation of the original new routes program infeasible.

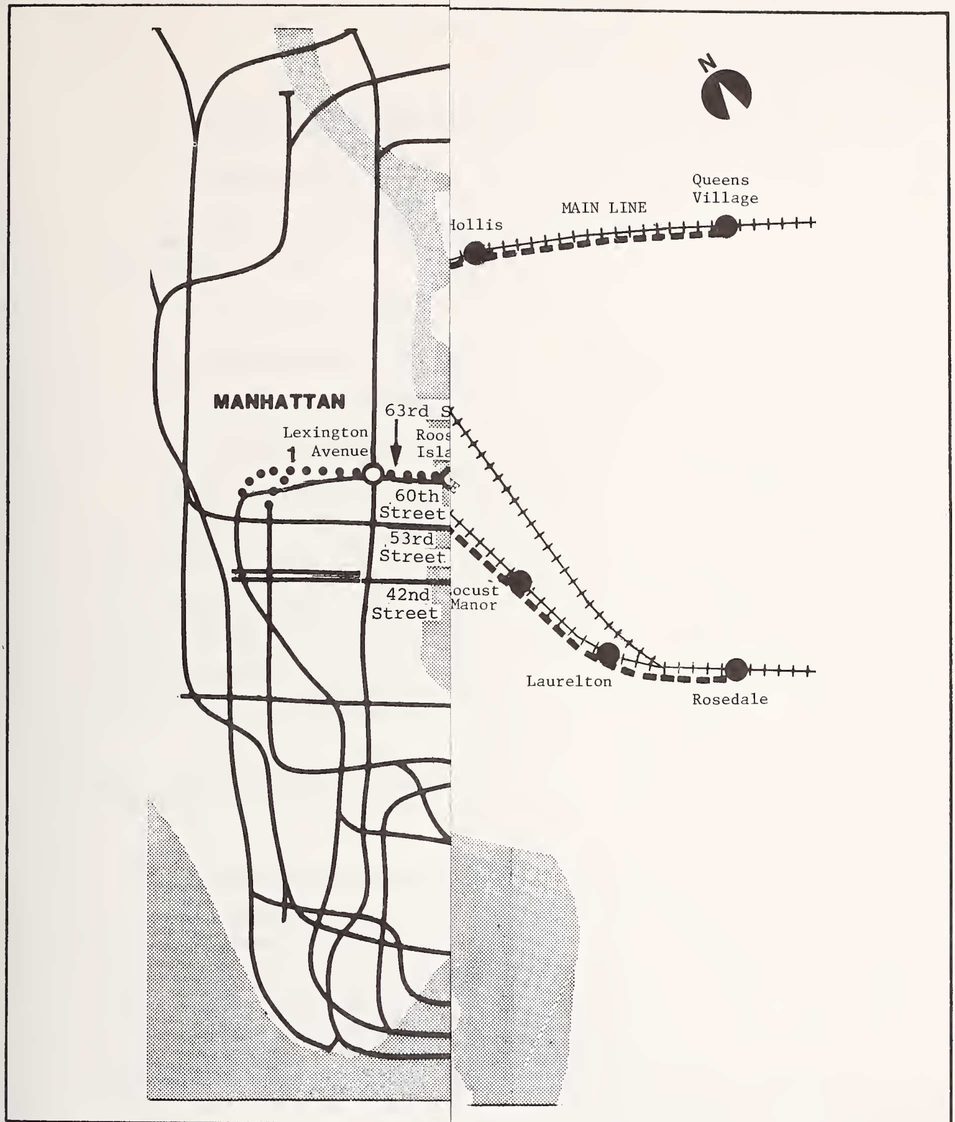
In the course of the study, a series of working papers and interim reports were prepared. These reports, (available as reference documents), describe the result of the analysis for a variety of topics --travel demand, physical planning, operations, environmental issues, and community involvement. The DEIS, prepared for discussion at the forthcoming project public hearing, documents the entire study process to date. It presents results and findings with particular focus on the environmental consequences of each alternative transit plan. An important aspect of the alternatives analysis process was the encouragement of active involvement of citizens and community groups. Before and after the public hearing, further opportunity will be provided to obtain comments and to respond to questions raised by citizens, community groups, and elected officials. The document itself and comments received at the public hearing will provide the basis for selection of a preferred alternative.

The DEIS fully describes the process of examining a broad range of options in sufficient detail to select a fewer number of candidate alternatives. It also presents the more detailed evaluation of the candidate alternatives (including no additional construction) with full disclosure of associated costs, service benefits, and environmental consequences. The DEIS does not present a preferred alternative. The preferred alternative will be selected after public hearing comments. A Preferred alternative Report will describe the selected alternative and will document the basis for the recommendation.

If one of the build options is selected as the preferred alternative, and UMTA concurs, the project development process will advance to the Preliminary Engineering/Final Environmental Impact Statement stage. In this phase, design elements are developed to provide an exact description of the selected alternative and a final estimate of construction costs that will indicate construction funding needs. After resolution of any remaining transportation or environmental issues, decisions regarding implementation and federal commitment to the selected plan can be made.

S.3 Alternatives Considered

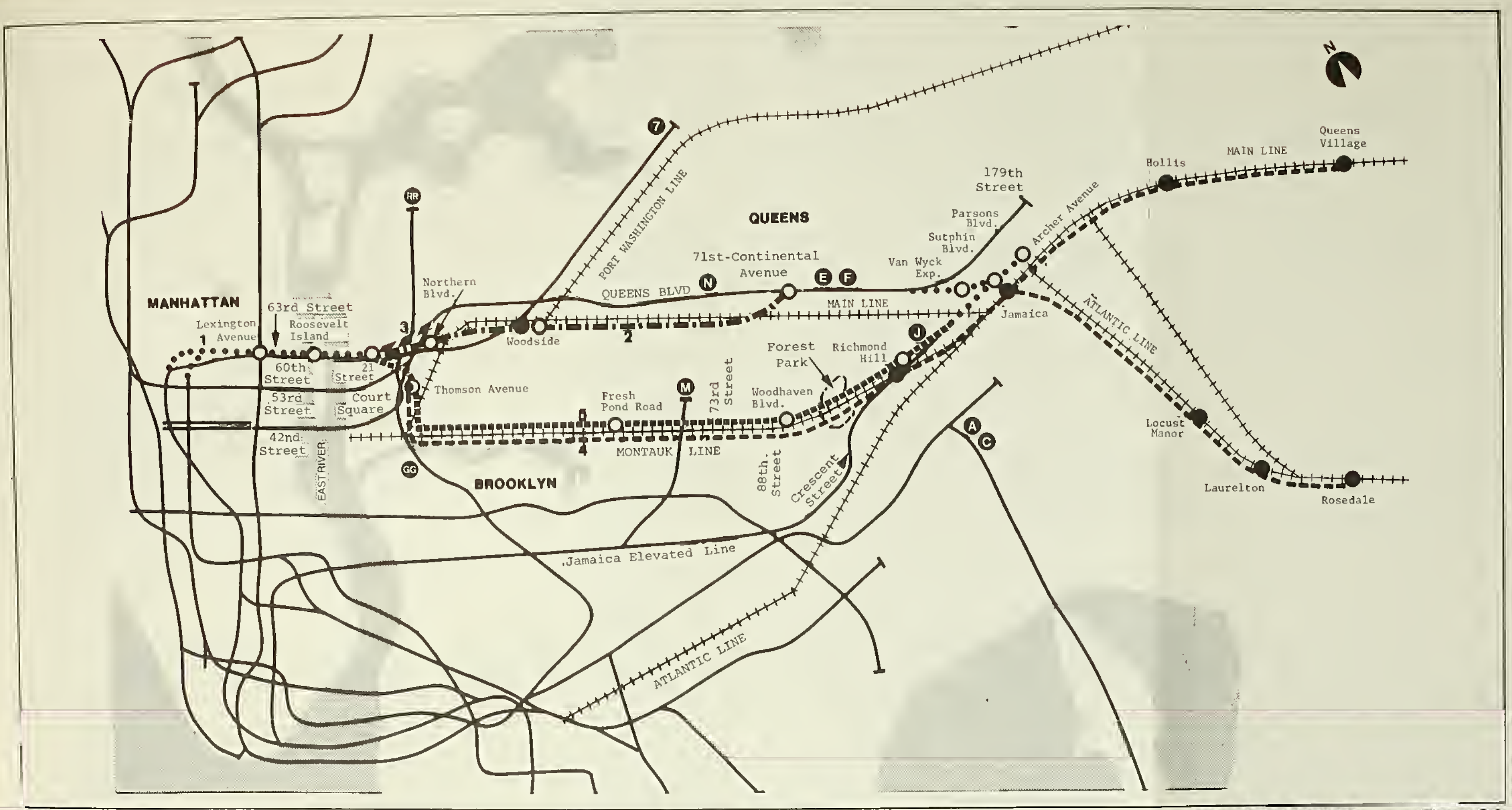
As a result of a three-year evaluation and screening process which examined some 18 Queens transit improvement options, five alternatives are now being considered for selection as the preferred Queens subway improvement plan. These alternatives, diagrammed on Figure S-2, include two "benchmark" alternatives:



Legend

1 No Additional Construction
2 Queens Bypass Express
3 Queens Blvd. Line—Local Connection
4 Subway/LIRR-Montauk Transfer
5 Montauk/Archer Ave.-Subway Connection
Long Island Railroad and Station
Subway Line and Station

ALL ALTERNATIVES Figure S-2



Legend

1 No Additional Construction
2 Queens Bypass Express
3 Queens Blvd. Line—Local Connection
4 Subway/LIRR-Montauk Transfer
5 Montauk/Archer Ave.-Subway Connection
Long Island Railroad and Station
Subway Line and Station

ALL ALTERNATIVES Figure S-2

- No Additional Construction -- "no build" beyond committed projects now nearing completion;

- Queens Bypass Express -- from the original new routes program.

Three additional options which emerged from the prior studies as candidates for the more detailed evaluation which leads to selection of the preferred alternative include:

- Queens Boulevard Line Local Connection

- Subway/LIRR-Montauk Transfer

- Montauk/Archer Avenue Subway Connection

S.3.1 No Additional Construction

This option represents the base for comparison with the build alternatives. It includes completion of the 63rd Street Tunnel line as far as 21st Street in Long Island City, the Archer Avenue Subway, and the Hillside Connector. Under this plan, the New York City Transit Authority (NYCTA) would operate subway service from a new 21st Street Station via the 63rd Street Tunnel to connections with existing subway lines in Manhattan. The Archer Avenue Subway provides connections with the J service and replaces the Jamaica Avenue Elevated from the vicinity of 123rd Street to Parsons Boulevard in Jamaica. The Hillside Connector links the Archer Avenue subway with the Queens Boulevard line. This alternative represents the implementation of ongoing, nearly completed projects with no further investment beyond committed funds.

The fact that relatively little service benefit has been derived from the more than $1 billion investment in these soon-to-be-completed projects underscores the need for consideration of additional rail transit connections.

S.3.2 Queens Bypass Express

This option represents an approved plan under the original "new routes" transit improvement program, with certain modifications. Express tracks would be constructed from the 63rd Street tunnel to a new station at Northern Boulevard, then along the south side of the LIRR Main Line to a new station at 71st-Continental Avenues, connecting there with the Queens Boulevard line. Under this plan, an intermediate station would be constructed at Woodside, Queens. Service on the new express tracks would be run from both the 179th Street and the Archer Avenue/Parsons Boulevard stations crossing into Manhattan via the 63rd Street Tunnel.

S.3.3 Queens Boulevard Line Local Connection

Under this alternative, subway service via the 63rd Street Tunnel would be connected to the local tracks of the Queens Boulevard line. This would be accomplished by constructing a connection between the Queens Boulevard line west of Northern Boulevard and the end of the 63rd Street Tunnel line at 29th Street.

To permit the maximum number of Manhattan-destined trains on the local tracks of the Queens Boulevard line, GG service between Queens and Brooklyn would be terminated at the Court Square Station in Long Island City. To accommodate this change to the GG service, a pedestrian passageway would be built to permit transfers between the GG (Court Square) and Queens-Manhattan services.

S.3.4 Subway/LIRR-Montauk Transfer

This alternative combines LIRR and NYCTA services to provide rail transit service, via the 63rd Street Tunnel, between Southeast Queens and Manhattan. Under this plan, the LIRR-Montauk Line would be modified to accommodate electric powered LIRR trains which would operate from Queens Village and Rosedale to a transfer station at Thomson Avenue in Long Island City. Passengers would then transfer to NYCTA subway local trains running through the 63rd Street Tunnel into Manhattan. The plan calls for renovation of existing stations at Richmond Hill, Locust Manor, Laurelton, Rosedale, Hollis, and Queens Village. Service now being provided to rail freight customers via the Montauk Line will be maintained.

S.3.5 Montauk/Archer Avenue Subway Connection

Under this option, NYCTA subway service would be operated from the Parsons Boulevard Station on the Archer Avenue subway line via a segment of the Jamaica Elevated and a connection at Richmond Hill to the LIRR-Montauk Line through the 63rd Street Tunnel into Manhattan. The Montauk Line would be modified to accommodate electric powered subway trains and no passenger transfer would be required at the proposed Thomson Avenue Station as in the Subway/LIRR-Montauk Transfer option. On-line subway stations would be provided in central Queens at Fresh Pond, Woodhaven Boulevard, and Richmond Hill. As with the Montauk Transfer alternative, rail freight service on the Montauk Line will be maintained. This alternative calls for removal of the Jamaica Avenue Elevated from Crescent Street to the proposed connection at Richmond Hill which will reduce congestion along Jamaica Avenue and make possible consideration of future intersection improvements. Replacement bus service will be provided.

The five alternatives identified above encompass a wide range of service benefits and costs. The comparative evaluation of these options presented in this DEIS are summarized on Table S-1 and are discussed in the following sections.

S.4 Costs and Significant Impacts

The comprehensive assessment of project alternatives as described in this DEIS encompasses costs, service benefits, and environmental consequences. The major determinants for the final capital costs are the physical characteristics of the facilities included in each alternative. Operating costs are influenced by differences in service, operational characteristics, and associated costs. Capital and operating costs are shown on Table S-1.

TABLE S-1

SUMMARY EVALUATION OF QUEENS SUBWAY OPTIONS

	No Add'l Construction	Queens Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR-Montauk Transfer	Montauk/ Archer
Peak Hour Tunnel Passengers					
63rd Street	180	16,500	36,600	10,400	19,400
53rd Street	58,900	35,200	32,200	53,600	51,000
Tunnel Utilization (% in Peak Hour)					
63rd Street	0.4	31.2	69.3	19.7	36.8
60th Street	78.8	66.6	68.1	75.7	72.5
53rd Street	111.6	92.6	61.0	75.6	73.4
42nd Street	75.5	75.4	72.7	75.6	73.4
Diversion from E/F line at 53rd St. Tunnel (millions/1 yr.)	None	18.2	48.5	9.6	14.4
E/F riders over UMTA recommended capacity (millions/yr)	12.7	2.1	1.5	5.1	3.5
Passenger miles traveled above UMTA recommended capacity (millions/yr)					
E/F only	197	132	42	76	71
All Queens	209	143	105	87	83
Passenger Minutes Saved					
Per trip	--	1.64	2.31	0.89	2.41
Per Yr (millions)	--	433.2	610.4	236.8	637.8
Residents with New Access	11,300	11,300	11,300	143,400	28,500
Construction Completion	1986	1993	1998	1995	1997
Capital Costs (millions of 1983 $)	--	222	931	488	594
Incremental Annual Year 2000 Operating Costs over No Additional Construction (millions of 1983 $)	--	7.4	22.5	38.1	13.3
Equivalent Uniform Annual Cost (EUAC) over No Additional Construction (millions of 1983 $)	--	23.7	46.4	42.0	34.4
EUAC per reduction in E/F passengers above UMTA recommended capacity	No Reduction	$2.20/p	$4.10/p	$5.50/p	$3.70/p
Displacement					
Residential	--	0	50	1	1
Employment	--	380	225	81	160
Noise Impacts	--	Neglible	Some increases but no sigifnicant impact	Significant increases during some daytime hours at several residential and park areas along the line	Similar to but greater than Montauk Transfer
Equity	--	Limited negative impacts accrue to population benefited	Generally, negative impacts and benefits accrue to same locations	Negative impacts occur in Mid-Queens; benefits to Southeast Queens	Negative impacts and service benefits accrue in same locations

S.4.1 Levels of Service

The five alternatives under consideration encompass a wide range of service patterns, and consequently exhibit marked differences in their resulting service qualities. As discussed in Section S.1 above, the need for improved subway service in Queens is indicated by service inadequacies related to overcrowding on the Queens Boulevard E and F Lines, lack of access to transit service, and lengthy travel times to Manhattan. In addition is the problem of service benefits to be derived from completion of the the "new routes" program, in particular, use of the 63rd Street Tunnel. The service characteristics and level of service measures for each alternative are discussed below.

Current NYCTA subway and bus fares have been used for evaluation of each alternative except the LIRR/Subway-Montauk Transfer which involved special fare assumptions. For this combined service option, an analysis was made for a range of fare levels. The midrange fare level ($2.20 - $2.80) was used for the Montauk Transfer ridership estimates and operations analysis developed for this DEIS. The consequences of the lower and higher fare assumptions are discussed in the appendix to the DEIS.

S.4.1(a) No Additional Construction

Under this alternative, the upper and lower levels of the new Archer Avenue Subway in Jamaica as well as the 63rd Street Subway line in Manhattan and Long Island City will be opened for service. This alternative includes only those facilities which currently exist or are under construction and nearing completion. The opening brings service to six new subway stations -- three in Jamaica, 21st Street in Long Island City, Roosevelt Island, and Lexington-63rd Street in Manhattan.

The extensive feeder bus network serving eastern Queens and western Nassau County would be altered to primarily feed the new Archer Avenue Station. In Jamaica, bus routes which now feed the Parsons Boulevard and 169th Street stations on the Queens Boulevard line would be changed to feed the Archer Avenue Station where substantially better transfer facilities are being provided.

Subway overcrowding for the morning peak hour was measured in terms of an acceptable comfort level, and by a critical practical capacity standard. Practical capacity represents not only overcrowding, but is the level at which passenger loading activities cause additional train delays. Estimates for the year 2000 show 17 percent of Queens passenger miles travelled at conditions exceeding the practical capacity level. In particular, travel on the Queens Boulevard Express Lines, and at the 53rd Street Tunnel would remain severely overcrowded. This alternative would cause no diversions from the Queens Boulevard E and F lines.

The percent of the Queens population with direct walking access would be increased by about one percent, or 11,300 potential riders. The four new Queens stations included in this action would be constructed under all of the five alternatives. Only the two Archer Avenue stations in Jamaica would add significantly to geographic coverage as the other two are near existing subway stations on other lines.

No Additional Construction represents the base travel times against which the other alternatives are compared. Since it would introduce minimal service changes and would not reduce delays associated with overcrowding, this alternative would not improve travel time to Manhattan from outer sections of the Borough. Instead, future travel time would probably increase because of increased delays from overcrowding.

No Additional Construction would result in severe underutilization of the soon to be completed 63rd Street Tunnel. The only station served by the tunnel in Queens would be at 21st Street, and it would draw from a market area already largely covered by subway service. Peak hour ridership through the tunnel would be about 220 people, which is two percent of the capacity of the eight scheduled trains.

S.4.1(b) Queens Bypass Express

The proposed express route would connect the 63rd Street Tunnel with the Queens Boulevard line just east of 71st-Continental Avenues Station using two additional grade level tracks adjacent to the LIRR Main Line. Express trains would traverse the Queens Boulevard line with connections to both the 179th Street and Archer Avenue Stations. New stations would be provided at Northern Boulevard and at Woodside.

This alternative is the only action that would virtually eliminate Queens subway overcrowding. The large reduction in overcrowding on the Queens Boulevard line would be achieved by providing additional express service from stations west of 71st-Continental Avenues Station to Manhattan. Passenger miles traveled above the practical capacity are reduced to about one percent of all Queens subway travel.

The transit access characteristics of this alternative are similar to the No Additional Construction and the local Connection alternatives. Besides the four new stations already discussed, this alternative includes new stations at Northern Boulevard and Woodside. Because of their locations, these stations would add no additional population coverage: the proposed Northern Boulevard station is near the existing Astoria Line 39th Avenue and the IND Queens Plaza stations, the proposed Woodside station, adjacent to the Flushing Line 61st Street station.

This alternative, along with Montauk/Archer, would result in the greatest saving in average travel time. The projected decrease for all Manhattan-bound peak hour trips originating in Queens is 2.3 minutes per passenger. At some locations, the savings exceed seven minutes per trip. The reduction in travel time reflects increased express service to Manhattan, and reduced delays associated with overcrowding.

The Queens Bypass Express represents by far the greatest utilization of the 63rd Street Tunnel both in terms of passenger demand and the number of trains. Peak hour ridership is estimated to be 36,000 or 80 percent of the capacity of the 26 scheduled trains.

S.4.1(c) Queens Boulevard Line Local Connection

This alternative would connect the 63rd Street Tunnel with the local tracks of the Queens Boulevard line. The GG service between Queens and Brooklyn would be terminated at Court Square Station in Long Island City where a pedestrian passageway would be provided for free transfer to the Queens Boulevard E and F services.

The local Connection reduces passenger miles traveled above practical capacity by drawing passengers from the overcrowded Queens Boulevard express track and providing them with more convenient and frequent local service to Manhattan. Additional capacity for the new trains would be made available by the link to the 63rd Street Tunnel. Passenger miles above practical capacity would be reduced to about 12 percent of the Queens total.

This alternative has the same transit access characteristics as No Additional Construction. It includes four new stations in Queens, with an increase in direct access of 11,300 potential riders.

Although the local Connection does not introduce additional express service, it would result in some travel time savings because overcrowding delays would be reduced on the Queens Boulevard line. Average travel time would be reduced by 1.6 minutes per passenger; for some riders, the saving would be 4.6 minutes.

This alternative which provides better local service on the Queens Boulevard line would attract substantial numbers of riders to the 63rd Street Tunnel. The tunnel would carry 16,500 peak hour passengers or 78 percent of the capacity of the 12 scheduled trains.

S.4.1(d) Subway/LIRR-Montauk Transfer

Under this alternative, electric powered LIRR trains would operate from Queens Village and Rosedale via the Montauk Line to a transfer station providing access to subway service via the 63rd Street Tunnel into Manhattan. The transfer station would also be accessible to passengers living or working in Long Island City; a passageway would connect the station with the Queens Boulevard lines.

As compared with No Additional Construction, the Montauk Transfer would result in only a modest decrease in passenger miles above practical capacity -- about 14 percent of Queens peak hour passenger miles. The ridership diversion from the Queens Boulevard express lines would be less than the other build alternatives.

This alternative would provide new high-frequency rail transit service to five LIRR stations in eastern and Southeastern Queens, thereby generating the largest increase in geographic coverage of the five alternatives. LIRR Queens-oriented service (QOS) trains would carry passengers from Hollis, Queens Village, Rosedale, Laurelton, Locust Manor, Jamaica and Richmond Hill along the LIRR-Montauk Branch to a new Thomson Avenue station, the location for transfer to subway service to Manhattan. With implementation of this service, approximately 143,400 Queens residents would gain direct access to high-frequency rail transit. This increase in geographic coverage is more than five times greater than that of the other four alternatives.

The Montauk Transfer would offer the least reduction in travel time of the four build alternatives. Although similar to Montauk/Archer in providing high speed service on the LIRR-Montauk Branch, it would carry only half as many riders as Montauk/Archer and it presents the delay of an additional transfer. This alternative would not divert enough riders from the E and F trains to reduce the passenger load factor below the practical capacity level, and would not significantly reduce delays on the Queens Boulevard line. Average travel time savings would be slightly less than one minute per passenger; areas with new service would have savings of over five minutes.

This alternative represents the lowest passenger utilization of the 63rd Street Tunnel of all the build alternatives. Peak hour ridership is estimated to be 10,400 passengers or 49 percent of the capacity of the 12 scheduled trains.

S.4.1(e) <u>Montauk/Archer Avenue Subway Connection</u>

Under this option, the LIRR-Montauk Line would serve as the connecting route between the Archer Avenue Subway and the 63rd Street Tunnel into Manhattan. The proposed connection between the Montauk and the Archer Avenue lines would be made in the vicinity of the Richmond Hill Station. Subway trains operating on the Montauk Line would have intermediate station stops at Thomson Avenue, Fresh Pond Road and Woodhaven Boulevard. This option calls for removal of a segment of the Jamaica Avenue Elevated J Line between Crescent Street and Richmond Hill Station. A replacement bus service would be installed on Jamaica Avenue.

This alternative would improve rider comfort by drawing passengers from the eastern portion of the overcrowded Queens Boulevard line and by creating a completely new rapid transit corridor on the LIRR-Montauk Branch. The new corridor would divert a number of passengers from the J, M and LL trains, which are not overcrowded, as well as from the Queens Boulevard line. The percentage of passenger miles at or above practical capacity would be similar to the local connection; the percentage at the comfort level would be exceeded only the Bypass Express alternative.

Geographic coverage would be extended to the area along the LIRR-Montauk Branch with new rapid transit stations at Fresh Pond Road, Woodhaven Boulevard and Richmond Hill. These stations are located south of the Queens Boulevard line and north of the BMT J, M and LL train routes. Unlike any of the other alternatives, Montauk/Archer would include rail transit cutbacks and loss of direct rail access to approximately 12,500 Queens residents. This loss would be due to the termination of the Jamaica Elevated east of Crescent Street where new bus service would replace the existing elevated rail line. The net increase in the Queens population with direct access to rail transit would be 28,500.

This alternative would result in reductions in travel time of 2.4 minutes per trip; for some areas with new service, the savings are over nine minutes. These savings result from direct express service to Manhattan from the Archer Avenue Subway and areas along the LIRR-Montauk Branch west of Jamaica, and from reduced overcrowding delays on the Queens Boulevard line.

This alternative has the second greatest passenger utilization of the 63rd Street Tunnel. Peak hour volumes are estimated to be 19,400 riders or 61 percent of the capacity of the 18 scheduled trains.

S.4.2 Arterials and Local Streets

Impacts resulting from the five subway alternatives on local streets and arterials fall into four basic categories. Traffic is affected by construction of new stations; modifications, and increased traffic at existing stations; grade crossing eliminations; and construction impacts. A summary of these potential impacts for each alternative is outlined below.

S.4.2(a) New Stations

Under the No Additional Construction alternative, new stations at Parsons and Sutphin Boulevards along the Archer Avenue subway line will increase congestion in the vicinity of both these stations particularly along Jamaica and Archer Avenues. If E line service is shifted to the Archer Avenue line, the bus routes diverted from 169th Street will significantly increase traffic at the Parsons Boulevard-Archer Avenue Station. The available capacity at Archer Avenue will improve bus-subway transfers. Traffic impacts from the new stations at Jamaica Avenue/Van Wyck and the 21st Street Stations are expected to be minimal.

The Queens Bypass alternative provides for new stations at Northern Boulevard/41st Avenue and Woodside Avenue. No change in bus routings is scheduled and impacts on the street network will be negligible.

Under the Subway/LIRR-Montauk Transfer alternative, the new station at Thomson Avenue is designed as a passenger transfer station with access via the Queens Plaza Station. Negligible surface transportation impact is expected.

The Montauk/Archer Avenue subway alternative calls for new stations at Thomson Avenue, Fresh Pond Road and Woodhaven Boulevard, in addition to the new stations provided by the No Additional Construction alternative. Travel demand at the Parsons Boulevard-Archer Avenue Station is expected to be greater than under No Additional Construction, significantly increasing traffic volumes on Archer and Jamaica Avenues. Congestion will increase in the vicinity of the Fresh Pond Road Station as will demand for off-street parking. Impacts on Woodhaven Boulevard due to the provision of bus pick-up and drop-off areas on the Woodhaven Boulevard viaduct would be substantial. Traffic impacts at the Thomson Avenue Station are expected to be similar to those described under the Montauk Transfer.

S.4.2(b) Modifications to Existing Stations

The Montauk Transfer alternative calls for a modification to the Richmond Hill, Locust Manor, Laurelton, Rosedale, Hollis and Queens Village LIRR Stations. Pedestrian access will improve at all stations including provisions for access for the handicapped. Congestion in the vicinity of the Rosedale, Hollis and Queens Village Stations will increase, particularly at the intersection of Springfield Boulevard and Jamaica Avenue in Queens Village and Farmers Boulevard and Hollis Avenue in Hollis. A new bus route will be added to both the Queens Village and Hollis Stations and existing routes will be coordinated with train schedules.

The Montauk/Archer Avenue alternative provides for an upgrading of the Richmond Hill Station. No significant traffic impact is anticipated on local streets in the vicinity.

S.4.2(c) <u>At Grade Crossing Modifications</u>

Under the Montauk Transfer and the Montauk/Archer alternatives, several locations where streets cross the existing LIRR-Montauk Line at-grade would require modification. Between the Thomson Avenue and Richmond Hill Stations there are seven existing crossings that require modifications. Six of these crossings will be served at four new grade separated locations; one crossing where traffic is very light will be closed under current proposals.

Five new grade separations would be at locations in the primarily industrial areas west of Fresh Pond Road. The new crossings in this segment of the line would result in small increases in travel time for vehicles accessing the areas south of the railroad tracks. However, improvements in traffic flow are anticipated because of roadway realignments and provision of easier turning movements, particularly for large trucks.

In the residential areas between Fresh Pond Road and Woodhaven Boulevard, a proposed new grade separation at 88th Street and a grade crossing at 73rd Street would result in greater travel times and distances and increased traffic on residential streets.

S.4.2(d) <u>Construction Impacts</u>

Construction of new stations and modifications to existing stations would, for the most part, be confined to off-peak hours to minimize adverse traffic impacts. Where necessary, periodic lane closures and street re-routings would be implemented and significant adverse impacts are not anticipated. The following construction activities, however, are not typical of system-wide procedures and significant impacts are anticipated.

The Queens Boulevard Line Local Connection alternative calls for additional trackage under Northern Boulevard. During construction, pedestrian access to sidewalks and vehicular access to businesses fronting the street would be impaired. Periodic lane closures would increase congestion on Northern Boulevard, although these impacts would be minimized by confining the lane closures to off-peak hours.

The Queens Bypass Express alternative would result in major traffic impacts due to extensive construction activity under Yellowstone and Queens Boulevards. Closing the eastbound service road of Queens Boulevard between Yellowstone Boulevard and 71st Avenue would increase congestion and impair access to the subway station and surrounding businesses.

The Montauk/Archer alternative calls for demolition of a 3.5 mile segment of the Jamaica Avenue Elevated line from Crescent Street to the vicinity of the

Richmond Hill Station. Construction for the Montauk Transfer alternative would result in minimal traffic impacts. Tunnel work for the Thomson Avenue Transfer Station would not significantly impact street-level conditions. Under both Montauk options, grade crossings will have to be eliminated and overpasses constructed at various points along the alignment.

S.4.3 Land Use/Socioeconomic and Community Resources

Detailed evaluation of impacts on land use and development trends, community resources, and economic conditions indicate that the five Queens transit improvement alternatives would have varied but, for the most part, limited impacts.

None of the five options would have substantial impacts on existing land use and development trends. Most of the land use changes that would occur are related to property takings necessary to construct or operate the various options. These are most substantial under the Queens Bypass Express option. Under the two Montauk options additional land use changes would result from the elimination of grade crossings and construction of bridges over the alignment and under Montauk/Archer, from the demolition of a 3.5 mile stretch of the Jamaica Avenue Elevated in Richmond Hill and Woodhaven. New development activity will be very limited -- some potential stimulation of residential development in Southeast Queens under Montauk transfer and in areas served by Fresh Pond and Woodhaven Boulevard Stations under the Montauk/Archer alternative. Strong commercial development influences are limited under all options, although the investment climate along Jamaica Avenue could be improved by the demolition of the Elevated structure under the Montauk/Archer alternative.

The Queens Bypass Express is the only alternative which will displace substantial numbers of residential units -- estimated at 50 units. All build options will displace some commercial or industrial uses. The greatest potential displacement will be caused respectively by the Queens Boulevard Line Local Connection (378 jobs), the Bypass Express (224 jobs), Montauk/Archer (163 jobs), and the Montauk Transfer (81 jobs). Montauk/Archer also has the greatest potential to impact existing freight operations. However, few disruptions to existing freight schedules are likely.

None of the options would have negative effects on existing safety and security conditions. New or expanded stations and passageways will be designed with passenger safety in mind. The two Montauk options would also improve safety conditions along that alignment by making informal crossings of the rail line more difficult.

None of the options would significantly affect community facilities or properties of historic significance. The two Montauk options would result in the greatest potential impacts on parks and open space: permanent visual impacts and some intrusive noise effects at several parks along the alignment, particularly Forest Park. Construction activity under the Queens Bypass Express option would have some adverse, temporary impacts on Gerald McDonald Memorial Park in the vicinity of the 71st-Continental Avenues Station.

The two Montauk options would have the greatest permanent visual impacts and have greater perceived impacts on community cohesiveness due to: an increased number of trains running along a now underutilized alignment; the erection of security and noise barriers along the alignment; and the construction of bridges over the existing alignment. Removal of a segment of the Jamaica Avenue Elevated under the Montauk/Archer option would substantially improve visual conditions.

S.4.4 Air Quality

The travel demand analysis for the Queens Subway Options Study indicates a basically constant trip-table total of transit ridership under each of the project build alternatives and the No Additional Construction option. Alternatives being considered under this study would not result in significant modal shifts or major route diversions. The alternative proposals would divert riders from one rail transit line to another to achieve the stated project goals: relief of overcrowding on the Queens Boulevard E and F lines and improved service on and accessibility to the subway system.

The estimated changes in vehicular traffic conditions under the project alternatives are localized in their extent, therefore mesoscale or areawide air quality burden analysis based on significant changes in vehicle miles traveled or major route diversions was not warranted. A microscale analysis to determine impacts on carbon monoxide concentrations at locations of major stations and along feeder routes was conducted.

Prediction at four receptor sites of maximum one- and eight-hour carbon monoxide concentrations for the analysis year of each of the alternatives (Table S-2) shows values substantially below the standards of nine parts per million (ppm) for the maximum eight-hour average and 35 ppm for the maximum one-hour average.

All of the no build and build values are substantially below the one- and eight-hour carbon monoxide standards. The low predicted values reflect the reduced emission values expected in the future due to vehicle turnover and the benefits of implementation of the state Inspection and Maintenance (I&M) program. In addition, at all sites the maximum increase in concentrations (i.e. the difference between the build and no build values) are well within allowable values. It can be concluded that none of the proposed project alternatives will have a significant impact on microscale carbon monoxide concentrations.

S.4.5 Noise and Vibration

S.4.5(a) Noise

Future noise levels for each of the alternatives were estimated from readings at a number of locations in residential areas along the LIRR study corridors. Noise levels and impacts at these sites are representative of the study corridors in which they are located. Future noise levels were estimated in terms of one-hour equivalent, 24-hour equivalent, and day-night noise levels, as described below. Although most of these levels represent significant increases, with mitigation, they still fall below established standards.

The No Additional Construction alternative will result in noise levels that are essentially the same as existing noise levels.

Both the Queens Bypass Express alternative and the Queens Boulevard Line Local Connection alternative will result in maximum noise levels that are comparable to or lower than the No Additional Construction alternative levels. The Subway/LIRR-Montauk Transfer alternative will result in significant increases (3.0 dBA or more) along the Montauk Line. At several sites along the Montauk Line a significant increase in maximum noise levels is expected (with changes in one-hour equivalent noise levels as high as 9.6 dBA). In Forest Park, while there will be some significant increases in maximum noise levels (3.0 dBA or more), noise levels will remain below 55 dBA, the recommended level for park land use. At some noise receptor sites, during some hours, noise levels with this alternative will be less than the No Additional Construction alternative levels. The reductions are achieved due to the proposed noise mitigation measures --noise barriers, roadbed and equipment improvement, and train scheduling.

The Montauk/Archer Avenue Subway Connection alternative will also result in significant increases (3.0 dBA or more) in noise levels along the Montauk Line. Although noise levels in Forest Park will increase, they will remain below 55 dBA, the recommended level for park land use. At some sites, during some hours, noise levels under this alternative will be less than under the No Additional Construction alternative. The reductions are achieved due to the proposed noise mitigation measures. At sites located in Woodhaven and Richmond Hill, removal of the elevated structure on Jamaica Avenue will result in significant reductions in noise levels due to this alternative.

In terms of maximum passby noise levels, with the four build alternatives, levels will not increase significantly over existing maximums and will in some cases be lower. However, it should be noted that the increased service provided with the build alternatives may result in two adverse conditions: first, there will be more of the high-level noise peaks, or maximums, throughout the day and night, and these peaks, because of their intermittent nature, are intrusive; secondly, in some cases trains will be running at hours where previously there were no trains or few trains and these again may produce an intrusive noise impact.

S.4.5(b) Vibration

None of the proposed project alternatives will result in any significant change in current vibratory levels and consequently none of the alternatives has a significant vibratory impact.

S.4.5(c) Construction Noise

Community noise levels during construction include noise from construction equipment operation and noise from construction vehicles and delivery vehicles traveling to and from the site. Noise due to construction will be similar to the noise generated by other major construction projects in the City and at times will be significant and intrusive.

S.4.6 Water Resources

The alternatives under study for Queens transit improvements are primarily along existing rights-of-way and are far removed from the surface waters that mark the north and western sides of the Borough. Because the alternatives are not expected to result in any significant stimulus to population growth in Queens, there would be no impacts associated with increased water use and subsequent sewage disposal.

During the construction of the proposed transit facilties there could be a minor impact on surface water quality because of siltation and erosion. To minimize this potential, erosion control measures will be employed during construction activity. These measures will prevent soil from clogging the combined sewers servicing areas where no construction would be necessary.

No impacts are anticipated on groundwater quantity or quality as there would be no groundwater pumping or discharge associated with any of the alternatives considered.

S.4.7 Ecology Resources

The one-mile segment of the LIRR-Montauk Line traversing Forest Park just west of Richmond Hill represents the only section of the various rail study corridors characterized as an ecologically sensitive area. This portion of the 508 acre park constitutes a mature natural forest and a valuable open space resource within the City.

The Montauk Line alternatives would not displace or significantly degrade existing wildlife habitats in Forest Park. The terrestrial and bird species within the park areas along the rail right-of-way are tolerant of urban activity and human disturbance. It can be expected that the species currently within the influence area of the rail line would adjust to proposed increases in train service and that impacts on wildlife would be negligible. There would not be significant impacts on any known threatened or endangered species from implementation of any of the five Queens transit study alternatives.

S.4.8 Energy

S.4.8(a) Operations Energy

The dominant form of energy consumed by operation of the transit services in this study is electricity, measured in kilowatt-hours. All revenue Transit Authority trains are powered by direct current, as are the electrified trains of the Long Island Rail Road. The electricity is generated externally by Consolidated Edison, the Power Authority of the State of New York and the Long Island Lighting Company in alternating current and is converted to direct current using trackside converters.

Some Queens transit operations consume energy in the form of diesel fuel rather than electricity, including public and private buses and LIRR-Montauk Branch diesel passenger trains. The latter would be discontinued under the two Montauk Line alternatives. However, because electricity is the dominant form of energy used by transit operations in Queens, it is appropriate for comparative purposes to estimate all energy consumption changes in kilowatt-hours. The conversions are based on the equivalent energy embodiment of kilowatt-hours in a gallon of diesel fuel.

Table S-2 displays the 1983 base calibration year and incremental annual energy consumption of the five Queens transit alternatives. Baseline and incremental energy consumptions are shown for the four modes of transit affected by the alternatives: subway, bus, LIRR electric trains and LIRR diesel trains.

Except for the Montauk Transfer alternative, Transit Authority subway operations represent the largest change in energy consumption for each alterantive. In the Transfer alternative, LIRR electric train operations represent the largest change.

The Montauk Transfer transit operations result in the largest annual energy consumption change, 72.79 million kilowatt-hours. This represents slightly less than a two percent increase over system-wide Transit Authority and LIRR usage.

S.4.8(b) Construction Energy

The energy impact of construction is based on the amount of construction material required and the energy required to process and transport these materials. For each of the build alternatives, quantities of building materials have been estimated and tabulated on Table S-3. The quantities are multiplied by a value for "embodied energy" which is different for each type of material. Embodied energy, measured in BTU's (British Thermal Units) is the total amount of energy required for the production of a material, including the extraction of raw materials, processing and transportation to the construction site.

S.5 Evaluation

The foregoing sections of this summary describe the problems in the Queens corridor, the characteristics and costs of the five subway options under planning consideration, the transportation performance of those options, and their impacts on all aspects of the environment. The evaluation of the project options brings this material into focus from four perspectives: (1) finances and implementability; (2) effectiveness --the degree to which each of the options fulfills the project's three major transportation goals; (3) efficiency -- the dollar cost versus option effectiveness; and (4) equity -- the fairness in distribution of costs and benefits. This last perspective examines the area-specific negative effects of each option (including environmental impact) against the area-specific improvements offered, to judge equity, i.e., who benefits, who pays.

S.5.1 Finances and Implementability

S.5.1(a) MTA Funding and Needs

The Metropolitan Transporation Authority is an umbrella organization created in 1968 to bring coordination and flexibility to the planning, operation, and development of the New York City metropolitan region's complex and aging

TABLE S-2 ANNUAL ENERGY CONSUMPTION - Year 2000

(IN MILLIONS OF KILOWATT-HOURS)

Alternative	Calibration 1983	No Additional Construction	Queens Blvd. Line Local Conn.	Queens Bypass Express	Montauk Transfer	Montauk Archer
Transit Authority (TA) Subway[1]	1,834.25	22.21	34.99	61.39	27.09	59.33
TA Bus[2]	1,253.51	0.54	0.54	0.54	6.00	2.27
LIRR Electric Cars[3]	317.59	0.00	0.00	0.00	40.09	0.00
LIRR Diesel Trains[4]	412.27	0.00	0.00	0.00	-0.39	-0.39
Total	3,817.62	22.75	35.53	61.93	72.79	61.21

[1]Assumes 6.88 kwh per subway car-mile.

[1]Equivalent energy units assuming 4.5 miles per gallon, 135,000 Btu per gallon of diesel fuel and 3413 Btu per kwh.

[3]Assumes 6.80 kwh per car-mile in New York City.

[4]Based on 0.007068 gallons per gross train ton-mile. Equivalent energy units assume 135,000 Btu per gallon of diesel fuel and 3413 Btu per kwh.

TABLE S-3 CONSTRUCTION ENERGY CONSUMPTION

(Embodied Energy in BTU's)

	Unit	BTU Per Unit	Queens Bypass Express Quantity	Queens Bypass Express BTU Total	Local Connection Quantity	Local Connection BTU Total	Montauk Transfer Quantity	Montauk Transfer BTU Total	Montauk/Archer Quantity	Montauk/Archer BTU Total
Steel										
a) Shapes	TON	3.7×10^{7}	18,000	6.7×10^{11}	3,300	1.2×10^{11}	4,200	1.6×10^{11}	4,300	1.6×10^{11}
b) Rails	TON	5.4×10^{7}	13,000	7.0×10^{11}	525	0.3×10^{11}	17,000	9.2×10^{11}	19,000	10.26×10^{11}
Concrete	CY	2.6×10^{6}	160,000	4.2×10^{11}	23,000	0.6×10^{11}	81,000	2.1×10^{11}	78,000	2.0×10^{11}
Lumber (Ties)	MBF	9.6×10^{6}	2,200	0.21×10^{11}	0	0.0	2,800	0.3×10^{11}	3,300	0.32×10^{11}
Stone (Ballast)	CY	1.3×10^{5}	160,000	0.09×10^{11}	0	0.0	90,000	0.12×10^{11}	105,000	0.14×10^{11}
TOTAL				18.2×10^{11}		2.1×10^{11}		13.32×10^{11}		14.32×10^{11}

transportation systems. Working with its seven affiliated operating agencies, MTA's primary responsibility is to obtain the maximum financial resources available for the benefit of the region's public transportation systems. It coordinates the planning and general policy direction of its agencies: approves their operating and capital budgets and performance plans; implements the financing of capital programs; and monitors their financial and operating activities. The agencies run their tranportation facilities and implement capital construction projects.

The MTA currently plans its capital needs and funding in five-year increments. The first Five Year Capital Program (1982-1986) is funding projects totalling $8.5 billion (approximately $6.5 billion for transit and approximately $2 billion for commuter rail). Some of these projects include rehabilitation of existing rail cars; acquisition of new buses and rail cars; improvements to track and line structures, rehabilitation and modernization of maintenance and shop facilities; modernization of power facilities and signal equipment and; improvements to passenger stations. To help fund its needs, MTA issues bonds secured by its operating revenues, by state service contracts, and by the operating surpluses of the TBTA. Other sources of capital funds include allocations from federal, state and local governments and the sale of tax benefits. Apart from those projects earmarked for specific government funding programs, MTA has a great deal of flexibility in allocating capital funds to specific projects. However, most, if not all of the program's current funding is limited to this Five Year Program. New legislation or some other action would be required to renew or expand its availability beyond 1986.

The potential for future funding is not yet known, but a general range can be projected based on past experience: the lower end of the range reflects the continuation of current funding sources, allowing for inflation and excluding clear one-time opportunities; the higher end of the range reflects the successful expansion of existing sources and the locating of new sources. The resulting funding projection ranges from $5 to $10 billion for the five years from 1986 through 1991.

Although the likelihood of reaching the top funding level is low, MTA's capital needs for the 1987-1991 period are high -- $10 billion (estimated as of March 1984), excluding the Queens Subway Options project. The largest portion (48 percent) of this is required to bring currently over-aged equipment and facilities into a state of good repair, 24 percent is needed for normal replacement, and new initiatives are estimated to require 28 percent.

Within the system, the Queens Boulevard line represents a low priority. At age 40, the line is one of the system's newest. No plans for major structural, signal or track replacements are currently contemplated. The only potential repairs for the Queens Boulevard line would be at those locations identified by a system-wide inspection program as deficient.

S.5.1 (b) Project Funding and Magnitude of Investment

For purposes of this study, it is anticipated that a substantial portion of the cost of a selected Queens Subway Option could be funded from the federal (UMTA) New Starts program. The MTA would compete for its share under the program and, if successful, would receive up to 75 percent of the project's capital costs. The remaining 25 percent (minimum) would come out of other than federal capital funds. Assuming optimistically that the MTA would be successful in obtaining New Starts funding, then the magnitude of "local" investment would range from 25 to a possible 50 percent of capital costs.

The effect of local funding for the Queens options on the Five-Year Programs would vary depending on the option. The local Connection would use up 0.4 to 1.6 percent of the 1987-1991 funds, a range double that of the Queens Bypass Express (0.2 to 0.8 percent in the same period). However, the Bypass, which would begin active construction later and extend it longer, would spend 2.0 to 8.2 percent of the next five years' budget (1992-1996), and would extend into the 1997-2001 time period. Expenditures for the Montauk options would also vary, with the Transfer's effect felt earlier than that of Montauk/Archer.

In the 1982-1986 Five-Year Program, none of the Queens options would have a significant impact on the total capital funding program, with the Queens Bypass Express requiring only 0.4 percent of the program as the maximum case. In the 1987-1991 period, the local Connection would constitute the maximum case share at 1.6 percent, still a relatively small impact. Thus, for the next seven years, the capital needs for any of the Queens subway options would be a small portion of the overall MTA capital program. For the 1992-1996 Five Year Program, major construction activity would be taking place on all options, with the most significant share amounting to about 8 percent for the Queens Bypass Express and the Montauk/Archer options.

The Queens subway options constitute a small to moderate portion of the total capital funding which will be raised by the MTA through local sources in its current and succeeding Five-Year Programs. Nonetheless, any capital funds allocated for the local share of the cost of building one of the Queens subway options would be a reduction in funding available for other identified needs.

Incremental operating costs of the options would also represent a small portion of overall operating cost and deficit. The cumulative incremental effect on the deficit from 1986 to 2002 would be to increase it by a range starting with the Local Connection at $90 million to the Montauk Transfer at $418 million (Queens Bypass -- $268 million --and Montauk/Archer -- $234 million -- would be at mid-range). The cumulative incremental effect of the Montauk Transfer alternative represents approximately a 1.9 percent increase of the total deficit.

The MTA must have an approved operating budget for each agency by January 1 of each year. This budget is based upon estimates of fare revenues and costs. The difference between fare revenues and costs is the anticipated shortfall or deficit. The budget approved by the MTA Board cannot have a deficit between income and expenses. In 1983, approximately 43 percent of the total MTA operating budget which was in excess of $3 billion was financed by fare box revenues. The remainder of the operating budget which would be considered shortfall or deficit was covered by funds from a variety of sources: Triborough Bridge and Tunnel Authority (6.7 percent of the total), State operating assistance (5.6 percent), regional sources (16.8 percent), UMTA operating assistance (4.85 percent) and local and other sources (15 percent).

arrangements. All options, except for Montauk/Archer, would require no change in operating practices and would maintain the distinct demarcation of services and facilities among the various operating agencies.

Montauk/Archer, by operating subway cars on LIRR right-of-way and by bringing passengers and freight over the same tracks, would create issues arising from federal (FRA and ICC) regulations and deferring labor practices. To comply with federal regulations, the options would require a special dedicated fleet of subway cars, modified to meet all applicable standards, unless an exemption could be obtained. An arrangement allowing LIRR to control the right-of-way, but give NYCTA trackage rights, would also be necessary to avoid invoking ICC jurisdiction over NYCTA (a situation that would create substantially greater costs). This arrangement, however, could lead to jurisdictional disputes between NYCTA and LIRR labor unions, since personnel from both agencies would work on the same trackage and since the various unions have differing rules, wages and benefit packages.

S.5.2. Effectiveness

The Queens subway options were tested for their effectiveness in meeting the project's three transportation goals: (1) to relieve overcrowding on the E and F lines; (2) to best utilize existing capacity in the Queens corridor; and (3) service in the corridors. As seen in Table S-4, all options showed a marked improvement over No Additional Construction in relieving overcrowding on the E and F lines, with the Queens Bypass Express generally at the high end of measured performance, and with local Connection, Montauk/Archer, and Montauk Transfer following.

Effectiveness of options utilizing existing capacity in the Queens corridor was more varied. Queens Bypass Express led the others in two of four measures, while local Connection performed best in the remaining two measures, with its early completion date (and therefore early utilization of "sunk" investment in the soon-to-be completed 63rd Street tunnel) and good cost effectiveness in bringing passengers to the new tunnel.

Effectiveness in improving transportation service in the Queens corridor can be measured in several ways: by reducing travel time; by providing subway service to areas currently without direct access; by increasing the number of passenger miles traveled in comfortable conditions; by improving access to the handicapped; by creating a sense of user personal security; by offering flexibility in choice of routes; and by creating an operating scheme that is flexible and reliable in the face of problems and other unusual conditions. In addition, two other aspects of the subway options affect transportation service: the ability to maintain service during construction and the capability of the transportation system to accommodate future plans for physical extension or increase in service. Performance to these measures was as follows.

S.5.2(a) Travel Time

All four options offer substantial corridor-wide annual travel time savings. Montauk/Archer and the Queens Bypass Express would yield the greatest annual time savings of 637.8 and 610.4 million passenger minutes, respectively.

TABLE S-4

EFFECTIVENESS OF OPTIONS IN RELIEVING OVERCROWDING ON THE E AND F LINES

	No Additional Construction	Local Connection	Queens Bypass	Montauk Transfer	Montauk/ Archer
Number of E & F riders over Target Capacity (millions/year)	12.7	2.1	1.5	5.1	3.5
Net reduction in E & F riders over Target Capacity (millions/year)	--	10.6	11.2	7.6	9.2
Diversion from E & F line at:					
53rd St. Tunnel	--	18.2	48.5	9.6	14.4
Queens Plaza	--	21.1	48.5	9.6	14.5
Roosevelt Ave.	--	14.7	54.5	12.0	13.8
71-Continental (millions/year)	--	(0.2)	49.5	12.2	11.3
E/F passenger miles travelled above:					
Comfort Level	282	253	64	234	228
Target Capacity	197	132	42	76	71
Practical Capcity (millions/year)	76	54	5	67	64
Reduction in E/F passenger miles above target capacity (millions/year)	--	65	155	121	133
Volume/Capacity ratios in peak hour at 53rd Street Tunnel					
F train	1.67	1.00	1.01	1.17	1.08
E train	1.23	0.85	0.82	0.87	0.85

local Connection would save 433.2 million passenger minutes -- about two-thirds that of the higher performance option --and the Montauk Transfer would do least well with 236.8 million passenger minutes saved.

S.5.2(b) Accessibility

Only two options would offer new direct access to the system, Montauk Transfer and Montauk/Archer, both by effectively adding new stations to the system. The Montauk Transfer would perform far better than any option, increasing access to 143,400 residents of Southeast Queens (a 12.5 percent increase in boroughwide accessibility). Montauk/Archer would net an increase in access for an estimated 28,500 people or 2.5 percent of the year 2000 baseline.

S.5.2(c) Reduction of Annual Passenger Miles Traveled in "Uncomfortable" Conditions in the Queens Corridor

All build options would perform better than the No Additional Construction option, offering a greater number of passenger miles at or better than the "comfort" level (150 passengers per 75-foot car, 100 per 51-foot car) and reducing the mileage at or above the target capacity (195 passengers per 75 foot car; 125 for 51-foot car). Queens Bypass Express would be most effective in reducing passenger miles traveled at above the comfort level from No Additional Construction; local Connection would be least so. Both Montauk options would be effective in reducing passenger miles traveled at above comfort levels, but would be more effective than the other two build options in reducing passenger miles traveled at above target capacity. The reason can be attributed to the heavy diversion from the E and F lines on the eastern part of that route, as well as the diversion from other subway lines in the corridor.

S.5.2(d) Accommodation of the Elderly and Handicapped

In the build options, all new or reconstructed stations will be built for "barrier free access" and will offer ramps, elevators, and adequate entryways, as appropriate, to allow the elderly, and particularly the handicapped, access to the system. However, because most of the City's other transit facilities are not accessible, the ability of the handicapped to use the entire system will still be restricted. The other build options would, therefore, offer only minor improvements over No Additional Construction.

S.5.2(e) User Personal Security

The Montauk Transfer option, which will provide new or upgraded stations all along the route, would be most successful in providing user personal security. At the Thomson Transfer Station, however, a long passageway to Queens Plaza with a change in level will require the realignment of a token booth and remote surveillance equipment to provide good observation.

Montauk/Archer would also provide new or upgraded stations along the entire route, although the number of stations (four) would be fewer than the seven provided with Montauk Transfer, but would also create a similar transfer passageway between Queens Plaza and the Thomson Avenue Station. The Queens Bypass Express, which would offer new stations at Woodside and at Northern

Boulevard, would perform similarly to Montauk/Archer. It would create one long transfer passageway --between Northern Boulevard and Queens Plaza.

The local Connection would affect perception of user security for passengers transferring from the GG to the E or F line. Instead of the current transfer at Queens Plaza, GG service would end at Court Square. There, GG passengers would traverse a 360-foot long passageway to the 23rd/Ely station to continue their Manhattan or Queens-bound trips. Although a token booth would be realigned and remote surveillance installed, the perception of user security of GG riders would be reduced.

S.5.2(f) <u>Flexibility in Choice of Route</u>

The Queens Bypass Express option would perform better than the other options in the number of lines (2.2) directly available at each station along its route. The local Connection would offer more flexibility than the others at two stations and better-than-average at one. Montauk/Archer would provide better flexibilty from one station.

S.5.2(g) <u>Operational Reliability and Flexibility</u>

Operational reliability measures the ability of each alternative to provide on-time service and adequate scheduled capacity during the peak hour. The major potential for delay is due to merges and crossovers and occurs at the 71st-Continental Avenues Station - Jamaica Yard leads - Jamaica-Van Wyck merge on the Queens Boulevard line. Other potential delay locations are Jamaica, Queens Village, and Valley Stream Stations for the LIRR Queens-oriented service trains. The local Connection would have the largest potential for delay, significantly greater than all other options. The Queens Bypass Express would have significantly fewer merges and crossovers than the other options, because its additional tracks would simplify operations on the Queens Boulevard line. Both Montauk Transfer and Montauk/Archer would have more potential train conflicts than the No Additional Construction option. However,the LIRR-Montauk trains would also pass through the Jamaica Station complex, which could introduce further delays.

Operational flexibilty is measured by the existence and available capacity of alternate routings which can be used in the event of a service outage on a line segment. Queens Bypass Express and local Connection would perform well on this measure, because the 63rd Street, 60th Street, and 53rd Street Tunnels can provide additional or back-up through-put for Queens Boulevard local and Express trains. Montauk Transfer would be less flexible, but it would provide an alternative route for LIRR trains bound for Manhattan. The Montauk/Archer would not provide significant alternatives for rerouting of either subway or LIRR trains, but passengers could transfer to and from the Queens Boulevard line at the Sutphin Boulevard and Parsons Boulevard Stations in Jamaica, allowing them an additional alternative route.

S.5.2(h) <u>Maintenance of Service</u>

This measure indicates the degree to which an alternative permits existing service to be sustained during construction. It takes into account the length of construction, the number of lines affected and the degree to which construction impacts operations on a given line. In this regard, local Connection would perform best, Queens Bypass Express, with its lengthy and complicated construction, would do least well, and Montauk Transfer would be less disruptive than Montauk/Archer.

S.5.2(i) Future Service

The Bypass would offer the greatest potential for both physical and operational expansion in the future; Montauk/Archer could accommodate some physical expansion, but the opportunity for service increase would be limited; similarly, the local Connection could link physically to an extension, but service expansion would be unlikely; the Montauk Transfer could offer the least in the way of future subway service to Queens residents.

S.5.3 Efficiency

Efficiency, in its application to the evaluation of the Queens subway options, measures and compares the options' overall transportation benefits and equivalent uniform annual costs.

As seen on Table S-5, local Connection would be most efficient in reducing overcrowding on the E and F lines at $2.20 of equivalent uniform annual cost per reduction in annual ridership above the UMTA target capacity of 195 passengers per car. Montauk/Archer and Queens Bypass Express would be somewhat less efficient and Montauk Transfer would be least efficient. (It should be noted that by modifying the operating schedule to increase the number of trains per hour, Queens Bypass Express could eliminate all overcrowding on the E and F lines. By reducing the 12.7 million increment above target capacity to zero, however, the option's efficiency rate would only decrease to $3.70.)

In terms of utilizing existing system capcity, the second transportation goal, both local Connection and Queens Bypass Express, with 90 and 80 cents per annual passenger brought to the 63rd Street Tunnel, respectively, would be most efficient. Montauk/Archer would run a close second, at $1.10, and Montauk Transfer, with a high EUAC and low ridership, would perform the least well at $2.60.

All options would perform efficiently in reducing passenger minutes traveled in the corridors -- an important measure of transportation service improvement. Local Connection and Montauk/Archer, each with five cents per passenger minute saved, would be the most efficient. Queens Bypass Express, at eight cents per pasenger minute saved, would do slightly less well and Montauk Transfer, at 18 cents, would be the least efficient of the group.

The last efficiency measure -- EUAC for reduction of passenger miles traveled above target capacity in the Queens corridor -- evaluates corridor-wide performance and includes a measure of duration of travel in uncomfortable conditions. The results are telling: Montauk/Archer, which diverts ridership from the E and F trains on the eastern end of the line and which also draws from other lines, would be most efficient at 27 cents per reduction in overcrowded passenger miles. Local Connection and Montauk Transfer, with 36 cents and 35 cents,

TABLE S-5

EVALUATION OF EFFICIENCY OF OPTIONS

(millions of 1983 dollars)

Measure	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Equivalent Uniform Annual Cost (EUAC) per Reduction in Annual Passengers Above Target Capacity on the E & F Lines	$2.20/p	$4.10/p*	$5.50/p	$3.70/p
EUAC per Annual Passenger Brought to 63rd Street Tunnel	$0.90/p	$0.80/p	$2.60/p	$1.10/p
EUAC per Passenger Minute Saved	$0.05/p min	$0.08/p min	$0.18/p min	$0.05/p min
EUAC per Reduction of Passenger Mile Traveled at Above Target Capacity in the Queens Corridor	$0.36/p mile	$0.45/p mile*	$0.35/p mile	$0.27/p mile

* By altering the operating schedule, QBE could reduce the increment above target capacity by 12.7 million (to 0); if so the EUAC/p would equal $3.70; QBE could also reduce the number of annual passenger miles traveled in the Queens Corridor at above target capacity by an additional 42 million, bringing its EUAC/p mile to $0.32.

respectively, would perform less well and Queens Bypass Express, at 45 cents, the least efficient of all. However, with modification of its operating schedule, this option's efficiency could be improved to about 32 cents per reduction in overcrowded passenger miles traveled.

The equity evaluation identifies area-specific "costs," i.e., negative impact, against area-specific benefits, particularly improved service to the transit dependent, to determine who benefits and who pays for each option as discussed in the following sections.

S.5.4 Equity

S.5.4(a) Queens Boulevard Line Local Connection

The local Connection option would relieve some overcrowding on the Queens Boulevard line and would provide improved service, primarily benefiting residents along the Queens Boulevard line transit corridor, including some neighborhoods with high concentrations of transit dependent populations.

Negative impacts would be relatively limited, but would primarily affect those who would not benefit from the option: some businesses which would have to be displaced in the vicinity of Northern Boulevard; some disruption would be caused by construction in that same area; commuters on the GG train from Brooklyn to Queens would be inconvenienced by the termination of through service (free transfers would be available to allow a continuation of Brooklyn Crosstown service for these commuters); and commuters on the Queens Boulevard and Astoria lines would also be temporarily inconvenienced during construction.

S.5.4(b) Queens Bypass Express

The prime benefit provided by the Bypass Express option would be substantial relief of overcrowding for residents along the existing Queens Boulevard line transit corridor. Prime beneficiaries would be concentrated in communities along the Queens Boulevard line corridor, particularly in Forest Hills, Rego Park, Elmhurst, and Jackson Heights. Transit dependent populations in Sunnyside, Woodside, Elmhurst, and Jackson Heights would also benefit from this new service and improved conditions as well under this option. This option would also have substantial negative impacts and these would not be as geographically concentrated as under the local Connection. These are primarily related to property acquisition and construction activity along the alignment. The greatest impact would be concentrated near the 71st-Continental Avenues Station in Forest Hills, particularly on Queens and Yellowstone Boulevards. These impacts would be temporary and this general area would reap substantial benefits from the new service. Service on the Long Island Rail Road Main Line would also be substantially disrupted without a corresponding increase in benefits. Residential and commercial/industrial uses would be displaced along the alignment. There is a potential for displacement of approximately 50 residential units including a recently constructed 18 unit apartment building. There would be noise and visual quality impacts along the transit corridor as well, resulting from the expansion of service, and comparable benefits may not accrue to many residents along the corridor. Residents along the Queens Boulevard line in Elmhurst and Jackson Heights who would benefit from this option would not bear any significant costs.

S.5.4(c) <u>Montauk Transfer</u>

Montauk Transfer would generate a variety of negative impacts to communities along the alignment, particularly in Glendale, Middle Village, and Maspeth and to a somewhat lesser extent in Richmond Hill and Woodhaven. Some of the impacts could substantially affect the quality of life in these communities. These inlcude substantial visual impacts along the alignment, more intrusive noise levels, and some significant noise impacts. There would also be some inconvenience due to changes in existing traffic circulation patterns. In addition, there would be delays for freight users along the Montauk Branch for up to two years; delays during off-peak and weekend hours at the Long Island Rail Road Jamaica station affecting the LIRR Main Line, Montauk Branch, and Atlantic Branch; the Flushing line would be closed for two to four weekends; and riders on the Queens Boulevard and Astoria lines would be temporarily inconvenienced during construction, as described under the local Connection. Finally, this option would provide little relief to the existing overcrowding on the E and F lines.

The substantial benefits under this alternative -- a large increase in geographic coverage of transit services, vastly improved service to Southeast Queens and to transit dependent populations in Jamaica and South Jamaica, improvements in travel time in areas such as St. Albans and Woodhaven, and improved user security -- would be concentrated primarily in areas that would not be experiencing the costs associated with this option.

S.5.4 (d) <u>Montauk/Archer</u>

Similar to Montauk Transfer, the costs associated with Montauk/Archer would primarily be borne by communities along the alignment, particularly in Glendale, Middle Village, Maspeth, Richmond Hill, and Woodhaven. Some of the impacts could be substantial enough to affect the quality of life in these communities. However, <u>unlike</u> Montauk Transfer, the prime benefits provided under this option would be concentrated in those areas experiencing the negative impacts. New stations at Woodhaven Boulevard and Fresh Pond Road would provide marked improvements in transit services to the neighborhoods experiencing the costs. Transit would be more accessible. Travel time to Manhattan would be cut substantially. Transit-dependent populations in the impacted communities would also receive improved transit service. In addition, this option would also contribute to relieving the congestion on the E and F lines and would provide substantial physical improvements through demolition of the Jamaica Elevated.

1.0 PURPOSE AND NEED

1.1 Introduction

The Queens Subway Options Study (QSOS) Alternatives Analysis (AA)/Draft Environmental Impact Statement (DEIS) has been prepared in conformance with applicable federal, state, and local regulations. Its purpose is to provide interested citizens, elected officials, and government agencies with the information they need to make a decision regarding proposed transit improvements in the Borough of Queens, City of New York.

The transit improvements contemplated are intended to address the major transit problems in Queens: crowding on existing transit services, specifically the Queens Boulevard E and F lines; inadequate coverage and access to transit service; and the best utilization of soon to be completed transit improvements -- the 63rd Street Tunnel between Manhattan and Queens and the Archer Avenue Subway and Hillside Connector in Queens.

This report does not make a recommendation regarding preferred transit improvements in the Borough. It presents the information objectively so the reader can make a judgment as to which alternative is preferable.

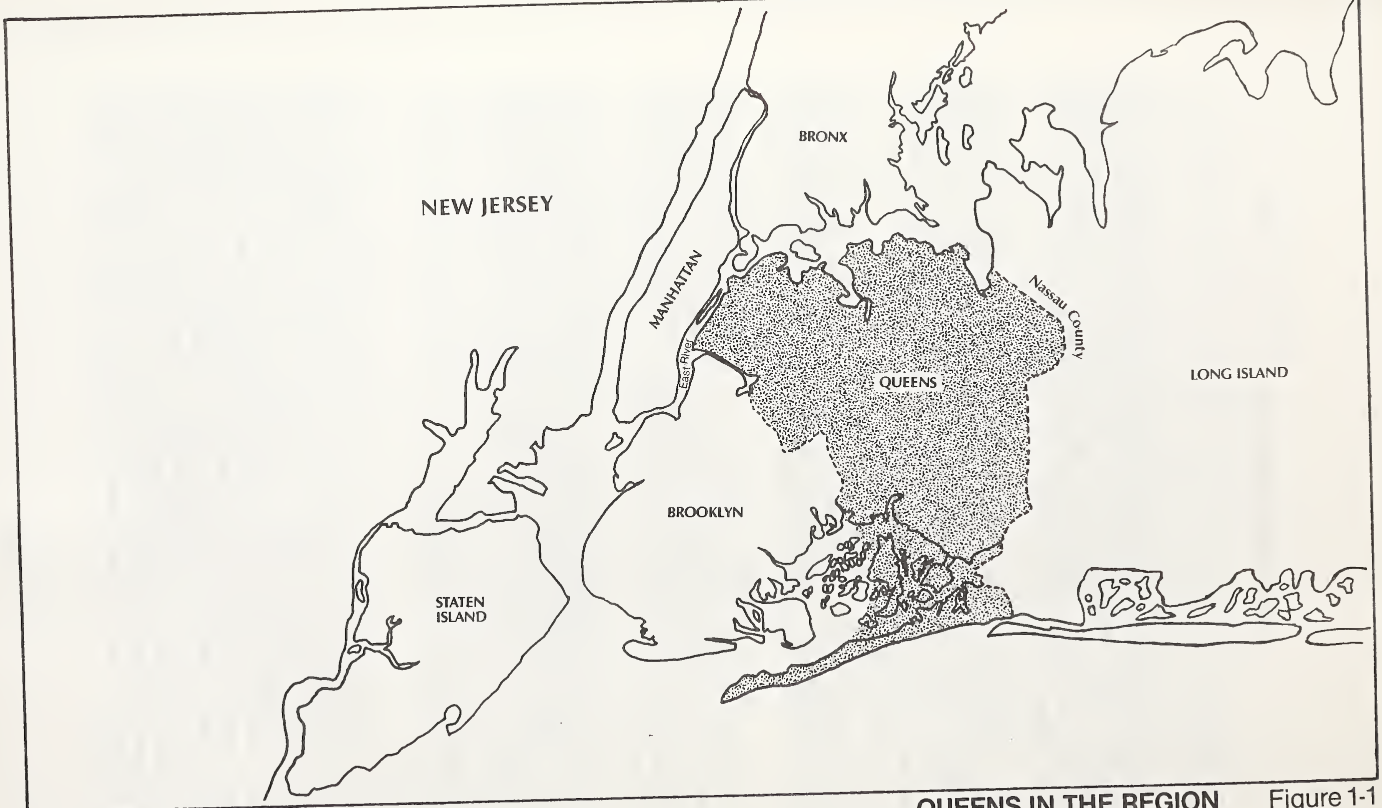
The preparation of an AA/DEIS document is a necessary step in the development of a transit project which involving the expenditure of large amounts of funds. If one of the candidate build alternatives it describes for expanding transit service in Queens is selected and approved, subsequent steps include preliminary engineering for the preferred alternative, final design, property acquisition and construction.

The first chapter of the AA/DEIS provides an overview of existing transit service in Queens, including deficiencies of that service, and a history of planning efforts which addressed those deficiencies. This chapter also describes the scope of the QSOS and the next steps in planning transit improvements in Queens.

1.2 Existing Transit Services and Problems

1.2.1 Background

The Borough of Queens (See Figure 1-1) is the largest borough in New York City and the second most populous. It has a total land area of 115 square miles and, as of 1980, a population of 1,891,325 people. By itself, it would be the fourth largest City in the United States. In Queens, as in the rest of the metropolitan region, journey-to-work trips are heavily oriented toward Manhattan destinations. The level of transit usage in Queens reflects the region's overall dependence on mass transit services for moving its work force into Manhattan's intensely developed Central Business District (CBD). Nowhere else in the United States are commuting patterns so rail dependent as in New York City. The 53rd Street IND Tunnel between Queens and Manhattan (E and F trains), for example, carries more passengers during the morning peak than all rapid transit lines entering Chicago combined, and Chicago has the second largest rail transit ridership in the country.



QUEENS IN THE REGION Figure 1-1

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Scale in Miles
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In addition, nowhere in the nation is the rail transit system as extensive as it is in New York. Transit service in New York began a century ago and achieved its greatest geographic coverage in 1940. Since then, while the population of New York City has declined from 7,454,995 to 7,071,030, the population of Queens has risen from 1,297,634 to 1,891,325. Transit services have not realigned to meet this shifting demand. Today, the E and F subway lines and the 53rd Street river crossing from Queens are overloaded and large numbers of Queens residents do not have ready access to the system.

1.2.2 Existing Services

Transit services in Queens include rapid transit, railroad and bus services. The rapid transit operations are New York City Transit Authority (NYCTA) subway lines and the Long Island Rail Road (LIRR), with trunk lines to Long Island. Bus operations include local service and express routes to Manhattan.

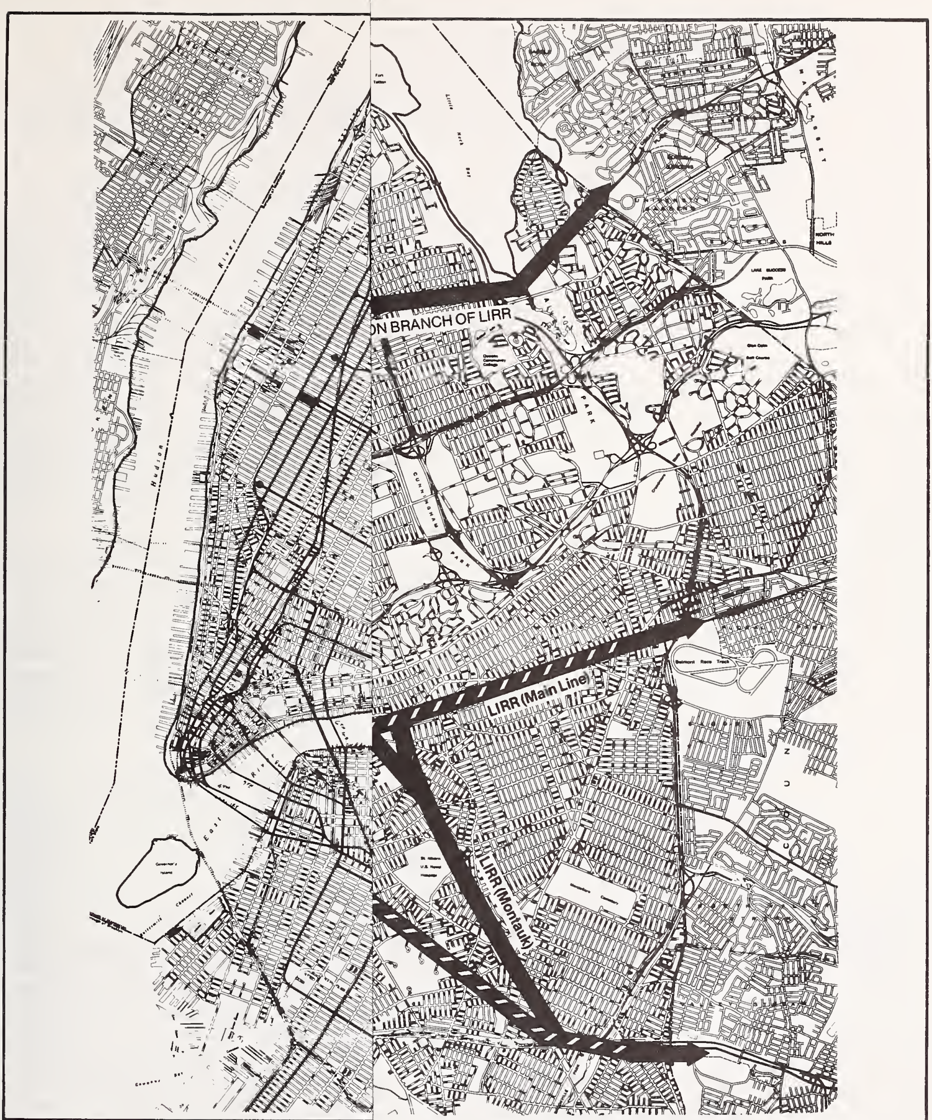
1.2.2(a) Subway Service

The subway lines serving Queens (See Figure 1-2) are the RR Astoria Line to Ditmars Boulevard, which crosses a relatively small part of the northwest corner of Queens and has only seven stations along its 2.34 miles of track; the Queens Boulevard line, the major trunk line in Queens, which has four express and local services and extends into Central Queens and Jamaica; the Flushing Line, which runs from Hunters Point to Flushing; and the Jamaica Elevated, which runs along Broadway in Brooklyn and then cuts northeast toward the Queens Boulevard line along Jamaica Avenue. The lines further south in Queens are affected only marginally by alternatives considered in this study.

The general orientation of the Queens subway lines is east-west and their respective East River crossings into Manhattan are at 60th Street, 53rd Street and 42nd Street. The 60th Street Tunnel, used by the RR and N (a Queens Boulevard local service) lines, feeds into Manhattan's BMT line running down Broadway. This service is slow and does not bring workers directly to the Midtown office area which lies east of Sixth Avenue.

The 53rd Street Tunnel, carrying E and F express trains from the Queens Boulevard line, cuts through the heart of the Midtown office district along 53rd Street, stops at Lexington and Fifth Avenues, and then feeds into the Sixth and Eighth Avenue IND lines. The F train runs along Sixth Avenue, and is a major office corridor north of 45th Street. The E train travels down Eighth Avenue serving the west side of Midtown and continuing down to the World Trade Center in lower Manhattan. The tunnel operates at capacity on scheduled headways of two minutes during peak periods. It provides the only direct access from Queens to the core of Midtown east of Sixth Avenue.

The Flushing line cuts across Manhattan along the 42nd Street corridor. During peak periods, passenger loads on this line, as on the Queens Boulevard line require riders to stand. This line terminates just south of the office core on 42nd Street. Passengers going further north or south must transfer at one of its three 42nd Street stations.



Legend

Existing Queens Transit Lines

Transit Lines which are study corrido

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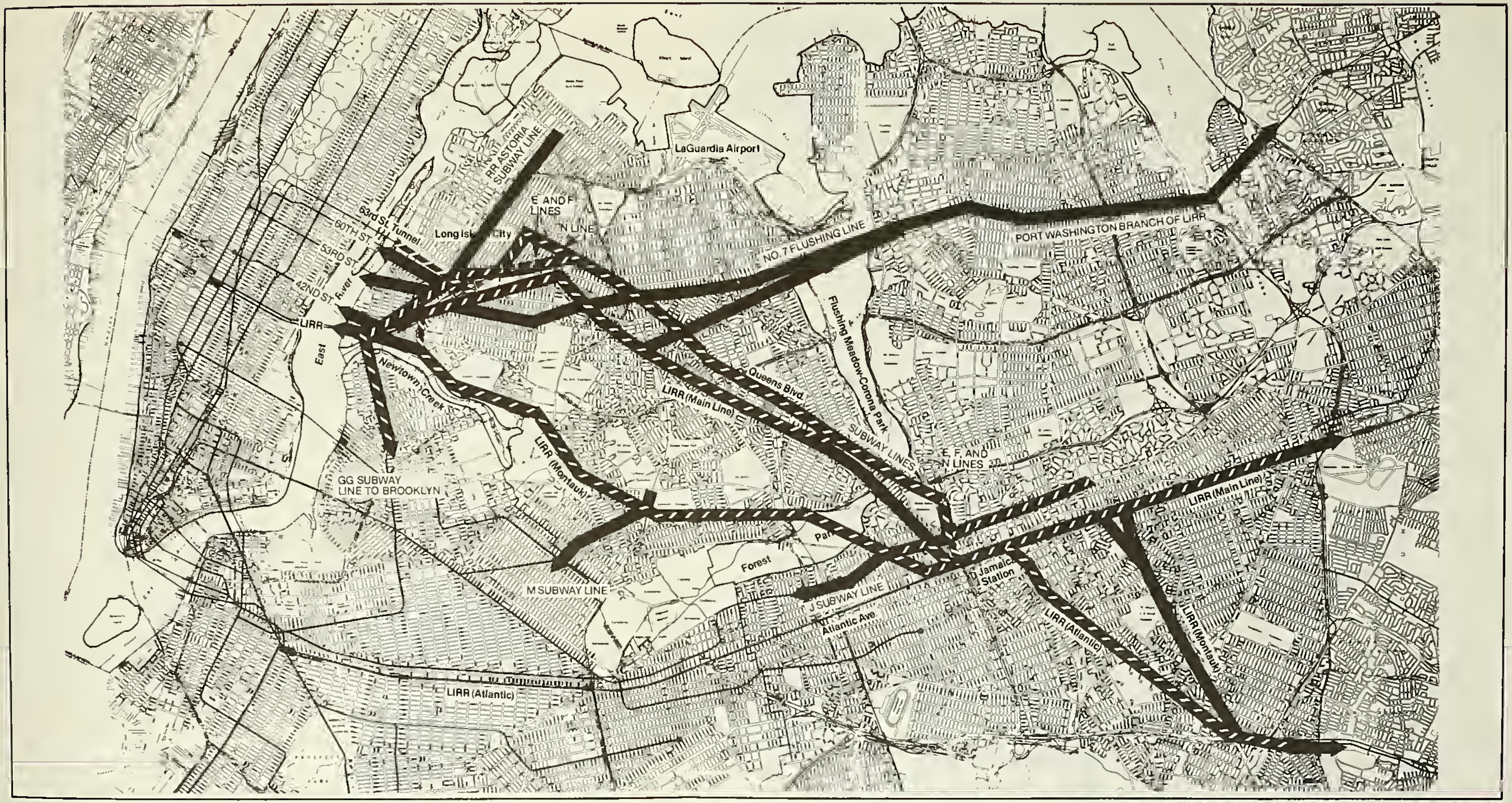
EXISTING QUEENS TRANSIT LINES AND STUDY CORRIDORS

Figure 1-2



Legend
- Existing Queens Transit Lines
- Transit Lines which are study corridors
- Study corridors which are not existing transit lines

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Scale In Feet

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EXISTING QUEENS TRANSIT LINES AND STUDY CORRIDORS

Figure 1-2

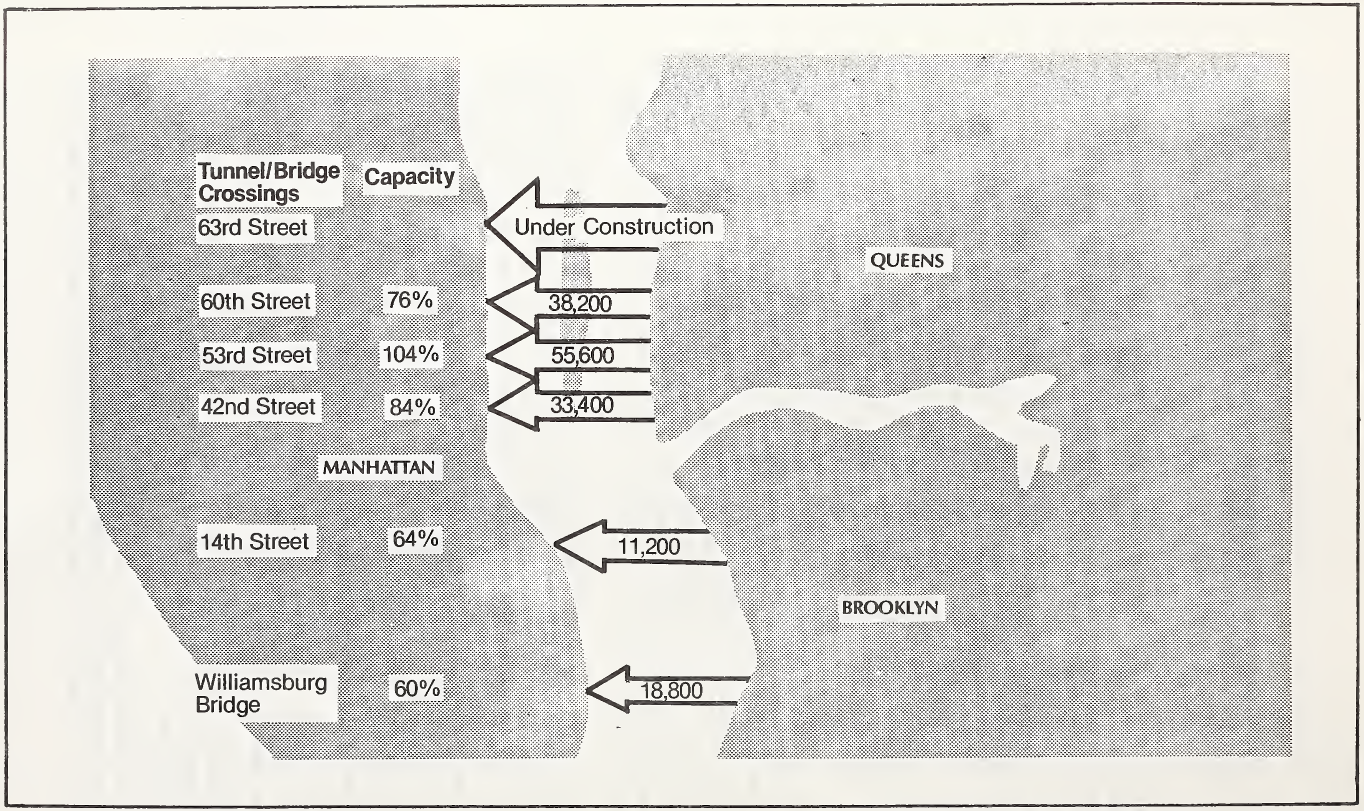
The J line, which is primarily a Brooklyn service, crosses into Manhattan at the Williamsburg Bridge below Houston Street. It serves lower Manhattan but does not provide direct service to Midtown.

The service areas for the Queens subway lines are fairly discrete, with only the Queens Boulevard and J lines extending past western Queens. Consequently, the Queens Boulevard line is overutilized -- alternative transit services are lacking and the line serves an enormous population. Approximately 550,000 people live within walking distance of at least one of the line's stations, of which approximately 55,600 people use the E and F services to Manhattan in the AM peak hour. (Walking distance is measured as 0.8 miles, the point at which half of those who live/work within that distance would chose to walk. This estimate is based on analyses of several studies of walk habits calibrated for Queens including the 1979 Citywide Origin-Destination Study.) Another factor contributing to the attractiveness (and hence overcrowding) of the E and F trains is its superior travel time to Manhattan. While the Astoria, Flushing, Jamaica Elevated and the Queens Boulevard local trains all average approximately 17 miles per hour through Queens, the Queens Boulevard Express trains (the E and F) offer average speeds of 21 and 25 miles per hour respectively.

In summary, overcrowding on the Queens Boulevard line is caused by the lack of alternative rapid transit service to central and eastern Queens, the magnitude of the population it serves, the desirability of its Manhattan destinations and its superior travel time. The 63rd Street Tunnel, currently nearing completion, provides additional capacity from Queens to Manhattan, with connections to Manhattan's Sixth Avenue and Broadway lines. Under its present configuration, however, it will terminate at 21st Street in Long Island City, Queens, without connecting to any transit service in Queens. Thus, it will not draw passengers from the Queens Boulevard line.

The extent of overcrowding on the E and F trains is evidenced in a number of ways. According to the TriState Hubbound cordon counts, they are the most heavily used rapid transit routes in New York City during the peak hour. As shown in Figure 1-3, the three Queens-Manhattan tunnel crossings carry a total of 127,000 in the AM peak hour. The Queens Boulevard Express crossing into Manhattan via the 53rd Street Tunnel, carries 55,600 inbound passengers during this period. None of the other Queens-Manhattan rail rapid transit crossings exceed 40,000 in the peak hour. The 53rd Street Tunnel accommodates in the peak hour almost 50 percent more passengers than either of the other two transit tunnels from Queens. The E and F lines experience peak hour loadings of over 232 passengers per car (in 1980) on equipment which has been identified as having a practical capacity of 220 passengers, or less than three square feet per passenger even when operating with the practical maximum number of trains possible (30 trains per hour). The trains are in fact severely crowded, not only at the Manhattan cordons, but for most of their runs through Queens. Trains are already crowded at the 71st/Continental Avenues station in Forest Hills, with an average of 181 passengers per car of which 72 are seated. They become even more crowded after absorbing heavy transfer volumes from local trains and transfers from the Flushing line.

Severe overcrowding results in increased travel time and operational delays as well as reduced passenger Level of Service. Passengers boarding at stations closer to Manhattan frequently are delayed because they are not able to board the



PASSENGER VOLUME AND PERCENTAGE OF CROSSING CAPACITY (1980 8–9 AM) Figure 1-3 first incoming train due to lack of room. Excessive crowding and shoving to get onto trains results in difficulty in closing train doors, which increases dwell time (the time a train spends in the station) and the failure rate for the doors.

1.2.2(b) LIRR Service

The Long Island Rail Road (LIRR) is the nation's largest commuter railroad and the only rail facility transporting people to Manhattan from Nassau and Suffolk Counties. It plays however, a negligible role in overall Queens transit service. Of its estimated 264,000 daily riders, only ten percent travel to or from Queens. Despite superior line haul travel time and comfort, a number of reasons limit use of the LIRR by Queens travelers.

One limitation of the LIRR service is its single Manhattan destination at Penn Station. Unless their workplace is within walking distance of Penn Station, LIRR riders must transfer to a bus or subway line to reach their final destination. Secondly, its geographic service area in Queens is limited -- only four of the ten LIRR stations in Queens provide direct service to Manhattan and are within the direct access market of the Queens Boulevard line.

The most important limitation of the LIRR for Queens riders is the fact that the railroad presently operates at capacity on its trunk lines in Queens. The two inbound East River Tunnels, with 43 trains during the peak hour, cannot accommodate any additional trains. Similarly, Jamaica Station, through which all LIRR trains from eastern and southeastern Queens must pass, also operates at maximum capacity with current delays. The railroad is presently overcrowded, with 8,000 standees during the peak hour, or about 20 per car, despite the fact that it is a scheduled commuter service which is expected to provide seats for all riders. The problem is of such severity that the railroad is currently looking at measures to increase capacity through Jamaica Station. As things now stand, the railroad cannot run any more Queens-oriented trains without seriously slowing service for Nassau and Suffolk riders; the trunk lines cannot accommodate additional trains; and without additional trains, the LIRR cannot draw Queens riders from the transit system.

Finally, the price of LIRR service is substantially higher than that of rapid transit --the railroad has a zonal fare system, while rapid transit is a fixed 90 cent fare. On the LIRR, a single trip from Jamaica Station to Penn Station in midtown costs $3.85, over four times as much as the subway. Even using a monthly ticket, the LIRR is still more than twice as expensive. Railroad ridership is high only in more affluent northeast Queens, where there is inconvenient feeder bus access to the subway system and a number of LIRR stations.

1.2.2(c) Bus Service

Given the overcrowding and incomplete coverage of the subway system, many Queens residents have turned to express buses for the Manhattan-bound journey. Four of these routes are operated by the Transit Authority, 16 are privately operated.

In the peak morning hour, the Transit Authority operates 19 express buses, and private companies, a total of 152 buses. Except for routes serving Rego

Park/Forest Hills and Far Rockaway, the express buses generally serve neighborhoods that at some distance from subway lines, including Queens Village, Bayside, Fresh Meadows, Douglaston, St. Albans and Ozone Park. Two of the private routes go to the Wall Street area, while the other 14 enter Midtown Manhattan via the Queens Midtown Tunnel or the Queensborough Bridge. The Transit Authority and privately-operated bus fare is $3.00 for a one-way trip.

Assuming that Queens express buses each carry 45 passengers, approximately 7,700 passengers use this mode to Manhattan in the peak hour. The express bus ridership is about six percent of Queens subway ridership to Manhattan.

Numerous private van services are known to operate between Queens and Manhattan. Their operators are primarily unlicensed and data reflecting the service they provide are not available.

In summary, existing conditions of the transit system in Queens are characterized by severe overcrowding of the E and F lines and inadequate geographic coverage and access to transit services. The 63rd Street Tunnel, which will be completed shortly, could serve to relieve that overcrowding, but presently funded transit improvements will not make appropriate use of that new facility.

1.3 New Routes Program

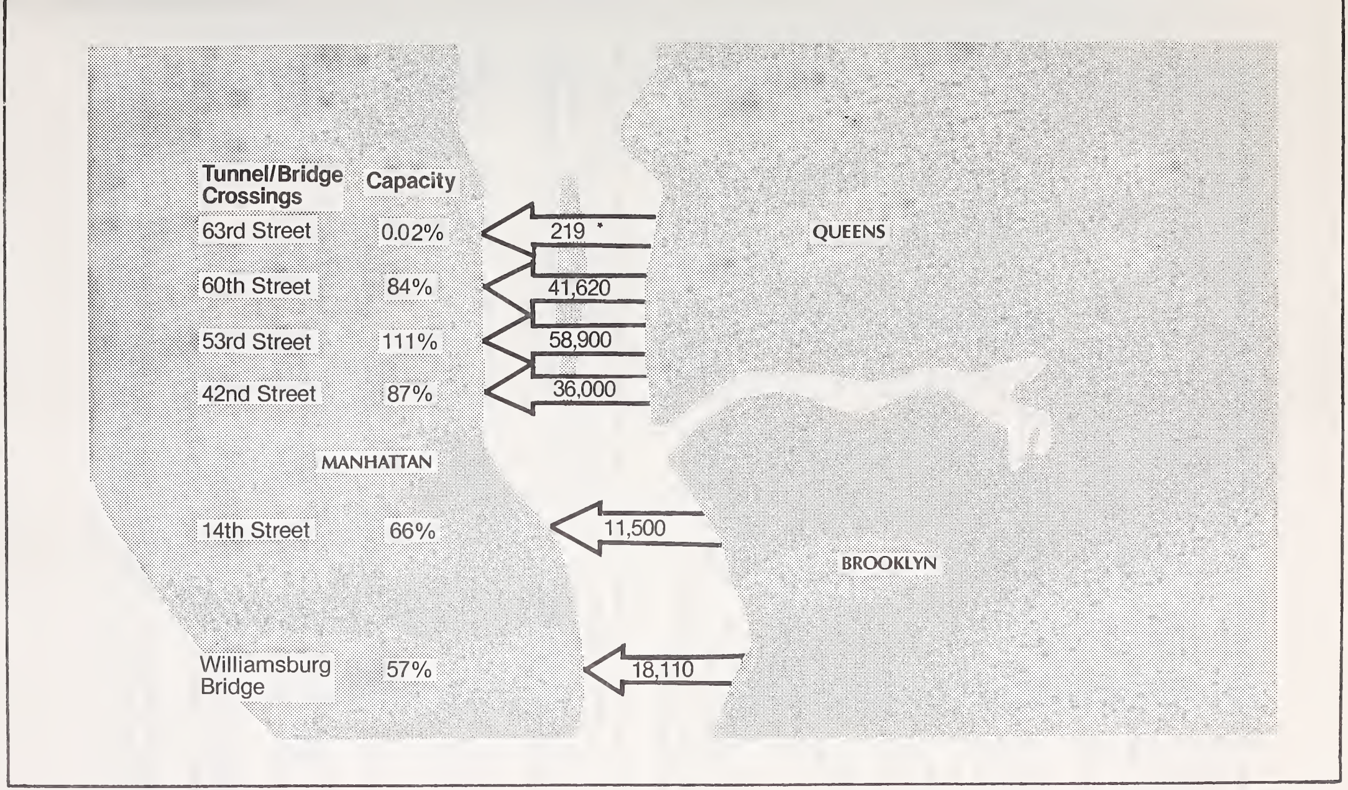
These problems were addressed in the New Routes Program set forth by the Metropolitan Transportation Authority (MTA) in March 1968. Described in Section 2.1.1(a), the program proposed extensive expansion of transit service in Queens, calling for a new two-track express route running adjacent to the Long Island Rail Road Main Line and parallel to the Queens Boulevard line. That route, the Queens Super Express, was to connect with the 63rd Street Tunnel under the East River, thereby providing another link between Manhattan and Queens and diverting riders from the overcrowded Queens Boulevard line.

In addition, the New Routes Program sought to extend transit service to previously unserved areas of Queens through projects such as the Southeast Queens Extension which would have used the Atlantic Branch of the Long Island Rail Road south of Jamaica for subway lines.

Lack of adequate funding and ever escalating construction costs in the 15 years since the New Routes Program was proposed, have seriously curtailed the scope of the ambitious plan. The only elements of the program which are fully funded, as described in Section 2.1.1(b), include the 63rd Street Tunnel and the Archer Avenue Subway and Hillside Connector in Jamaica.

The initial transit service problems in Queens which the New Routes Program was designed to solve, were overcrowding on the Queens Boulevard line and inadequate coverage by rapid transit service. The partial completion of the New Routes Program, however, has raised another important problem: how to make the best use of the few improvements that have been made under the program.

The 63rd Street Subway and Tunnel was completed at a cost of $795 million. Yet, as Figure 1-4 shows, by the year 2000 only about 219 people from Queens will



*East of Roosevelt Island

PASSENGER VOLUME AND PERCENTAGE OF CROSSING CAPACITY (2000 8–9 AM) Figure 1-4 cross the East River through the tunnel in the AM peak hour representing a utilization of only 0.02 percent of the tunnel's capacity. This extremely low ridership is due to the fact that service on the line will end at 21st Street, its only station in Queens. How to make better use of this expensive tunnel and the nearly completed Archer Avenue Subway, a $489 million transit improvement in Jamaica, are important issues.

1.4 Project Identification

The Queens Transit Alternatives Study, was initiated in 1979 in light of the existing problems of mass transit in Queens and the deferment of the completion of the New Routes Program. The initial three year study was conducted by the New York City Department of Transportation with participation by the MTA. The study represented the effort to reexamine the Queens Bypass Express component of the New Routes Program and to investigate alternative, less expensive ways of making needed improvements. It evaluated eighteen alternatives for improvements and ultimately selected five alternatives for more detailed analysis.

This second-phase analysis was undertaken in the Queens Subway Options Study. The QSOS is the formal alternatives analysis that the Urban Mass Transportation Administration (UMTA) has required since 1976 for any major mass transportation improvement prior to committing federal funds. These studies involve preparation of a Draft Environmental Impact Statement (DEIS), comparing all candidate alternatives. After selection and approval of a preferred alternative, a Preferred Alternative Report (PAR) will be prepared. The PAR describes the locally recommended alternative and documents the basis for the recommendation decision.

The QSOS AA/DEIS examined the following five candidate alternatives selected by the Queens Transit Alternatives Study for detailed analysis.

- No Additional Construction -- No further expansion of facilities beyond the committed projects indicated in Section 2.1.2.

- Queens Bypass Express -- Express subway service along the LIRR Main Line from 63rd Street Tunnel to 71st/Continental Station (originally called Queens Super Express in the New Routes Program).

- Queens Boulevard Line Local Connection -- Connection of the 63rd Street Tunnel to the Queens Boulevard local service.

- Subway/LIRR - Montauk Transfer -- Electrified LIRR service on the Montauk line from Queens Village and Rosedale Stations to a transfer station with the 63rd Street line at Thomson Avenue.

- Montauk/Archer Avenue Subway Connection -- Subway service on the Montauk line connection linking the 63rd Street Line with the Archer Avenue Subway near Richmond Hill Station.

The study corridors for the QSOS, which include the routes and surrounding areas of the alternatives, are shown in Figure 1-2.

During the course of the QSOS, a series of working papers and interim reports were prepared which analyzed travel demand, physical planning, operations, evaluation procedures, environmental issues, and community involvement. The results of these analyses and, in particular the environmental consequences of each alternative transit plan are presented in the DEIS. An integral component of the alternatives analysis/DEIS process was the active participation of citizens and community groups. Their involvement assured that the definition and analysis of the project was responsive to community concerns.

The DEIS and technical supplements serve as a basic evaluation document to support project development decisions. The DEIS provides a detailed evaluation of the candidate alternatives (including No Additional Construction) with full disclosure of associated costs, service benefits, and environmental consequences.

This Alternatives Analysis/Draft Environmental Impact Statement complies with regulations set forth in the National Environmental Policy Act of 1969 and policy requirements of the Urban Mass Transportation Administration regarding decisions on federal funding of transportation projects. The aim of these requirements is to provide the public and governmental decision makers with sufficient information to make an informed choice among alternative proposals.

The DEIS will be discussed at the project public hearing. Ample opportunity will be provided to obtain comments and to respond to questions raised by citizens, community groups and elected officials. The public is encouraged to comment on this DEIS. The document and the comments received at the public hearing will provide the basis for selection of a preferred alternative.

Once selected and approved by UMTA, the preferred alternative will enter the Preliminary Engineering/Final Environmental Impact stage of the planning process. During this phase, design elements are developed which provide an exact description of the preferred alternative and a final estimate of capital costs is made. Finally, a decision is made whether or not to implement the adopted plan.

2.0 ALTERNATIVES CONSIDERED

Five basic alternatives are being considered for improvement of transit service in Queens. These Queens transit alternatives, which include a No Additional Construction option, are identified below in Section 2.2 and described in detail in the following sections of this chapter.

Current NYCTA subway and bus fares have been used for evaluation of each alternative except the LIRR/Subway-Montauk Transfer. For this combined service option, an analysis was made for a range of fare assumptions. A midrange fare level ($2.20-$2.80) was used for the Montauk Transfer ridership estimates and operations analysis developed for this DEIS. The consequences of the lower and higher fare assumptions are discussed in Appendix A.12.

2.1 Screening and Selection Process

2.1.1 Background

The New York City transit system is the most extensive in the nation. Nowhere in the United States do as many people depend on rail transit for their daily travel. From the beginning of transit service in the late 19th Century until the early 1940's, the City's rail transit (subway) system expanded. Then, with the abandonment of several of the elevated lines, the system steadily contracted until 1978. The MTA was created in 1968 and shortly thereafter, in recognition of system problems and capacity needs, the New Routes Program was developed to provide badly needed expansion of subway service in Queens and in other priority corridors in the City.

2.1.1(a) New Routes Program

The New Routes Program, set forth by MTA in the late 1960's, represented a major expansion of public transportation facilities and services in the New York Metropolitan Region. Under this program, a number of major projects were proposed to serve the Long Island-Queens-Manhattan corridor. The Program included several projects in Queens by both the New York City Transit Authority (NYCTA) and the Long Island Rail Road (LIRR). The program provided for construction of the following major facilities:

- 63rd Street Tunnel - a four-track two level East River crossing to accommodate NYCTA and LIRR service.
- Queens Super Express - a two-track express subway route from the 63rd Street Tunnel along the Long Island Rail Road Main Line to Continental Avenue, where it would connect with the Queens Boulevard line (now considered as Queens Bypass Express).
- Northeast Queens Extension - a two-track subway branch along the Long Island Expressway, from the Queens Boulevard line to Kissena Boulevard.
- Archer Avenue Subway - a four-track two level subway to replace the Jamaica Avenue Elevated, from the vicinity of 127th Street to Parsons Boulevard in Jamaica.

- Hillside Connector - a subway connector to link the Archer Avenue subway with the Queens Boulevard line.
- Southeast Queens Extension - a line between the Parsons Boulevard station of the Archer Avenue subway and Springfield Boulevard in Southeast Queens, to be constructed on the ROW of the Atlantic Branch of the LIRR.

2.1.1(b) Committed Projects

At the present time, there are three committed projects from the New Routes program. These facilities are in the advanced construction stage and scheduled for completion within the next two years.

- 63rd Street Subway and Tunnel - Construction of a two-level tunnel under the East River at 63rd Street for both the LIRR trains (Lower Level) and NYCTA service (Upper Level). For subway service, this tunnel would provide the fourth East River crossing to Queens, which would link the Sixth and Seventh Avenue subway lines in Manhattan to a proposed subway line in the Long Island City section of Queens. Stations are being constructed in Manhattan at Lexington Avenue, on Roosevelt Island and at 21st Street and 41st Avenue in Queens. A total of $795 million has been committed to this project.
- Archer Avenue Subway - Removal of a portion of the Jamaica Avenue Elevated line between 165th Street and 127th Street and replacement with a two level subway line along Archer Avenue with a station at Sutphin Boulevard and a terminal station at Parsons Boulevard. The lower level would connect to the Jamaica Avenue Elevated at approximately 127th Street and the upper level to the Queens Boulevard line via the Hillside Connector.
- Hillside Connector - Construction of a line between the Queens Boulevard line and the proposed Archer Avenue subway in the vicinity of the Van Wyck Expressway. A station is being completed parallel to the Van Wyck Expressway in front of Jamaica Hospital. A total of $489 million has been committed to the Hillside Connector and the Archer Avenue subway.

Due to changed circumstances over the past fifteen years, other major facilities proposed under the New Routes program have been deferred.

2.1.2 Development and Selection of Alternatives

Rising construction cost estimates of originally proposed New Routes projects and lowered availability of funds called for a re-evaluation of the program. Moreover, limited capital funding for public transportation placed greater emphasis on rehabilitation of the existing system. It was also recognized that the anticipated expenditures (in excess of one billion dollars for the three committed projects) will provide relatively little service improvement and far less than was anticipated under the original program.

Reflecting changed circumstances, various agencies proposed alternative plans to the approved program. A central theme among the schemes suggested is that comparable service can be provided at a lower cost and implemented sooner than the original plan. Moreover, the various new proposals attempted to utilize and derive greater benefit from those construction projects underway that will be completed within a few years.

2.1.2(a) Queens Transit Alternatives Study

In response to the changing transit climate and in recognition of varying views regarding the New Routes Program, the Queens Transit Alternatives Study was initiated in 1979. This work was led by the New York City Department of Transportation and a Steering Committee composed of representatives from eleven other public agencies. The overall study objective was to reexamine the original plan in light of current circumstances and explore the benefits and disadvantages of alternative transit options. These first-stage analyses involved formulation of sketch plans for a number of alternatives, initial evaluation of these alternatives, second-round evaluation and identification of candidate alternatives for more detailed engineering, service, and environmental study. The evaluations incorporated analysis of projected ridership, operating costs, capital costs, capacity, and institutional problems of joint utilization.

The Queens Transit Alternatives Study investigated a total of 18 transit plans. Of these potential plans, three schemes plus two benchmark options were selected for the more detailed second-phase studies. These alternatives described in more detail below, comprise the five basic options now being considered:

- No Additional Construction - No further expansion of facilities beyond the committed projects indicated in Section 2.1.1 (b) above.
- Queens Bypass Express - Express subway service along the LIRR Main Line from 63rd Street Tunnel to 71st/Continental Station.
- Queens Boulevard line Local Connection - Connection of the 63rd Street Tunnel to the Queens Boulevard local service.
- Subway/LIRR - Montauk Transfer - Electrified LIRR service on the Montauk Line from Queens Village and Rosedale stations to a subway transfer station at Thomson Avenue. Subway service would be provided by extending the 63rd Street subway to the transfer station.
- Montauk/Archer Avenue Subway Connection - Subway service on the LIRR Montauk Line with a connection to the Archer Avenue subway via the Jamaica Avenue Elevated at Lefferts Boulevard and Jamaica Avenue.

These five candidate alternatives encompass a wide range of service benefits and capital costs. Detailed evaluation of these options were performed under recently completed studies as outlined in the following section.

A complete description of the previous analysis is contained in two reference documents, published in January 1982: Queens Transit Alternatives Study - Final Report and Technical Appendix. The reports are available for inspection at the MTA offices at 347 Madison Avenue, New York, NY.

2.1.2(b) Queens Subway Options Study - Alternatives Analysis and DEIS

It is under the Alternatives Analysis phase of the current Queens Subway Options Study that this Draft Environmental Impact Statement was prepared. The prior analysis was directed at sketch planning and examining a large number of potential schemes in a preliminary fashion. The focus of these second-stage studies is the more detailed investigation of the five alternatives identified above. The work involves comprehensive examination of engineering issues, patronage and service, and the environmental consequences of each of the transit options. The examination of five candidate options under this Alternatives Analysis Draft Environmental Impact Study was performed in sufficient detail so that the choice of a recommended plan can be based on reliable cost and impact information.

2.1.3 Modification of Candidate Alternatives in Scoping Process

2.1.3(a) Receipt and Disposition of Comments

An initial step in the Queens Subway Options study activity was the solicitation of community input regarding the key dimensions and content of the alternatives analysis. On August 26, 1982, an informational scoping meeting was held at Queens Borough Hall to provide the opportunity for interested citizens and organizations to review and comment on the then proposed study work plan. After more detailed delineation of the study scope and identification of key study participants, a meeting with community representatives on project details was held on November 29, 1982. The extensive community involvement program, which developed thereafter, is described in Appendix A.1 of this DEIS. The program represents a key component of the scoping process and has facilitated modification and refinement of the alternatives in response to community concerns.

Comments on the alternatives and issues raised during the scoping process, aided by the community involvement programs ranged from service and travel demand items, which were applicable to all alternatives, to neighborhood specific concerns, such as the treatment of grade crossings and safety of children at nearby schools and playgrounds. All comments received responses verbally or by way of written material. Many of the issues and concerns raised during the scope and community development program were reflected in the formulation and evaluation of design and location suboptions. For example, environmental issues raised during the process resulted in the expansion of the noise analysis program and the modification of train schedules during nighttime hours. Community transit service concerns were also incorporated into the analysis, which examined 27 service options to arrive at the now proposed service plan for each of the candidate alternatives. A detailed account of the public involvement program and disposition of community comments during the course of the study is included in the Technical Supplement to this DEIS.

2.1.3(b) Screening of Suboptions

In development of the comparative analysis of the five Queens Subway Options, several suboptions evolved. These are alternative operational or physical solutions to specific portions of an overall project alternative. For example, the connections to the 63rd Street Tunnel can be made in several different ways; a subway-LIRR transfer station on the Montauk Line can be configured in a variety of plans; or grade separations, where required, may be accomplished by more than one plan. During the course of the study, several sets of suboptions were developed in sufficient detail to permit a comparative screening evaluation geared to the selection of one preferred suboption for a given set.

The screening process addressed both service and physical design choices. The suboptions were evaluated, generally, according to the criteria set forth in Working Paper No. 17: Evaulation Procedures. They are grouped in broad categories of transportation service, socioeconomic and environmental impact, costs, and implementablity. The overall list of criteria or evaluation factors for screening of suboptions is shown below. Because some of the suboptions related to very specific portions of the primary project alternatives, not all the evaluation criteria were applicable in every case.

Evaluation Factors for Screening Suboptions

- Cost
- Property Acquisition
- Residential Displacement/Disruption
- Business Displacement
- Employment (Job Displacement)
- Transit Operations
- LIRR Operations
- Constraints on Future Service Options
- Maintenance and Storage Yards
- Freight Service
- Traffic Operations
- Pedestrian Circulation
- Community/Municipal Services
- Land Use Change
- Local Area Service
- Convenience (transfers, connections, special users)
- Visual Quality
- Noise
- Vibration
- Riparian Rights
- Construction Disruption

Physical Suboptions. The physical refinements encompassed suboptions of alignment, station configuration and street crossings. Suboption sets, evaluated for the build alternatives, are listed below. The detailed comparative analysis of the sets is described in Working Paper No. 16: Interim Detailed Analysis - Evaluation of Suboptions.

Queens Bypass Express

- On Originally Proposed Alignment (alongside LIRR Main Line)
- 4½ Feet Closer to LIRR Main Line

Queens Boulevard Line Local Connection (Northern Boulevard)

- Eastbound Connection - at transit property line
- Eastbound Connection - under EB local track
- Eastbound Connection - under EB express track

Subway/LIRR-Montauk Transfer - Thomson Transfer Station

- Side by Side Transfer Station
- Over/Under Transfer Station
- "Tee" Transfer Station

Montauk/Archer Avenue Subway Connection

- Thomson Avenue Station
  - At-Grade Station
  - Underground Station

- Dutch Kill Crossing*
  - Maintain Existing Movable Bridge Operation
  - Close Bridge to Water Traffic (Purchase Shipping Rights)
  - High Level Transit Structure
  - Restrict Transit Bridge Openings to Off-Peak Hours

- Greenpoint Avenue Grade Separation*
  - Loop Intersection Along Newtown Creek Bulkhead
  - "Tee" Intersection Adjacent to Rail Line

- Laurel Hill Boulevard Grade Separation*
  - Loop Ramp Under Brooklyn-Queens Expressway Viaduct
  - Diagonal Ramp East of BQE Viaduct

- Maspeth Avenue Grade Separation*
  - On Existing Maspeth Avenue Alignment
  - Offset Alignment

- 88th Street Grade Crossing Elimination*
  - Bridge 88th Street Over Rail Line
  - Close Street to Vehicular Crossings

- Woodhaven Station
  - Widen Existing Street Overpass
  - Provide At-Grade Bus Access East of Woodhaven Boulevard
  - Locate Station at 88th Street
  - Locate Station at 80th Street

* These grade separations and crossings apply to Montauk Transfer as well as to Montauk/Archer.

o Montauk Line Connection to Jamaica Avenue Elevated in Richmond Hill

(Several Horizontal and Vertical Alignment Options for Montauk Line Connection to Jamaica Elevated)

Service Suboptions. The in-depth and iterative evaluation process used to select a preferred service option for each of the five primary alternatives consisted of a three-step process. First, travel forecasts were prepared for each alternative for Year 2000. Detailed patronage estimates were obtained by route, station and individual link. Second, a number of evaluation criteria were selected for the initial screening. For each criterion, specific definitions and computation procedures were delineated. Third, the output of the two prior steps was combined to provide the evaluation results for each service option. This information was then analyzed to select a preferred plan for each primary alternative, which was then subjected, under the alternatives analysis, to more intensive scrutiny for the full range of prescribed evaluation criteria.

Four evaluation criteria, associated with project transportation goals as specified in Working Paper No. 17: Evaulation Procedures, were used for comparison of 27 service options to select a preferred service plan for each alternative.

Route Share. Utilizes measures of the number of passengers diverted from the overcrowded Queens Boulevard express service (E and F trains); the number of passengers using the 63rd Street Tunnel; and the number of passengers using the alternative itself.

Comfort. The criterion reflects the passengers' perception of congestion. This performance measure is quantified as the number of passenger-miles traveled in conditions exceeding the comfort level for E and F trains. By defining the criterion in terms of passenger volumes and distance, the duration of congestion is also gauged. In the analysis, comfort level was established at 150 passengers per car, which is two-thirds of the practical capacity (220). In essence, there is approximately one standee for each seated passenger.

Volume/Capacity. Similar to comfort, this criterion measures the extent of overcrowding. It defines how well facilities and service are matched to passenger demand. For the initial screening, volume/capacity ratios were computed at the four Queens East River crossings. Practical capacity values of 220 passengers per car were utilized for IND services (63rd, 60th, and 53rd) and 145 passengers per car on IRT services (42nd). In addition, expected demand levels per car for each service comprising an option were also computed.

Effective Utilization. This criterion indicates the extent to which a service option makes effective use of the four Queens East River crossings. It is measured by tabulating the total number of passengers (inbound AM peak hour) that exceed or fail to reach practical capacity of each tunnel. For the 63rd Street Tunnel, capacity was established at 30 trains per hour. For the other tunnels, capacity was computed on the basis of present service levels, which operate at or near practical capacity.

In view of the limited objective of the initial screening, the four transportation evaluation criteria provide a reasonable basis for comparison of service suboptions for each primary alternative. As described in this DEIS, for final evaluation of the five alternatives, (each with a single preferred service option) the full range of the specified criteria will be utilized. Over 40 criteria, associated with project goal classes (transportation, socioeconomic, physical planning, environmental, financial, implementability), will apply. The detailed evaluation of service options is described in Working Paper No. 19: Evaluation of Service Sub-Options.

2.2 Description of Alternatives

This section presents a detailed description of each of the five candidate alternatives considered in this Alternatives Analysis/DEIS report. These five basic project alternatives have resulted from the earlier phase work as summarized in Section 2.1 above in which a number of alternatives were evaluated and screened. The five project alternatives are identified as follows: (1) No Additional Construction, assuming completion of the Archer Avenue subway, the Hillside Connector and the 63rd Street Tunnel as far as 21st Street in Long Island City; (2) Queens Bypass Express -- a New Routes Program improvement -- an express route from the new 63rd Street Tunnel to a station at Northern Boulevard, then along the Long Island Rail Road Main Line to 71st/Continental Avenue, where it would connect with the Queens Boulevard line; (3) Queens Boulevard line -- Local Connection linking the 63rd Street Tunnel with Queens Boulevard local service (the GG trains would turn back to Brooklyn at Court Square under this option); (4) Subway/LIRR-Montauk Transfer which would use an electrified LIRR Montauk Branch to run LIRR trains from Queens Village and Rosedale to a new station at Thomson Avenue in Long Island City, where passengers will transfer to NYCTA trains running through the 63rd Street Tunnel into Manhattan; and (5) Montauk Line/Archer Avenue Subway Connection, a plan to bring NYCTA trains from Parsons Boulevard station on the Archer Avenue subway, along the Montauk Branch tracks through a new station at Thomson Avenue and on into Manhattan via the 63rd Street Tunnel.

Each alternative is separately described in a format which presents physical characteristics -- alignment, stations, storage and maintenance facilities, grade crossings, and other additional features. For the physical facilities, references are made to design drawings which are appended to this DEIS. More detailed physical plans of each alternative at scales of 1"=100' and 1"=40' are included in the Technical Supplement to this DEIS.

This section also presents the service characteristics of each of the alternatives including subway operating plan and feeder bus route modifications associated with the alternative.

The subway service characteristics (routings, stopping patterns, frequencies) set forth for each alternative represent a feasible operating plan facilitating comparison among the options. It is not necessarily the exact plan that would be put into operation if and when a given alternative is selected and implemented.

2.2.1 No Additional Construction

2.2.1(a) Physical Characteristics

No new capital facilities would be built under this "benchmark" alternative. Construction now under way on the Archer Avenue and 63rd Street subways will be completed by late 1985 or early 1986 (see Figure 2-1). When the current construction is completed, the physical characteristics of these subway lines will be as follows:

Archer Avenue Line. This subway line, consisting of an upper and lower level, is being constructed on the north side of the Long Island Rail Road Main Line in Jamaica (see Figure 2-2).

The upper level of this subway line connects to the existing Queens Boulevard line at Hillside Avenue. From this connection, the subway continues south to a new station called Jamaica/Van Wyck in the vicinity of Jamaica Hospital. Continuing south and curving to the east under the Van Wyck Expressway the subway continues under Archer Avenue to new stations at Sutphin Boulevard and Parsons Boulevard. Beyond the Parsons Boulevard Station, the upper level subway curves south under the Long Island Rail Road Main Line to a terminus under South Road in Jamaica.

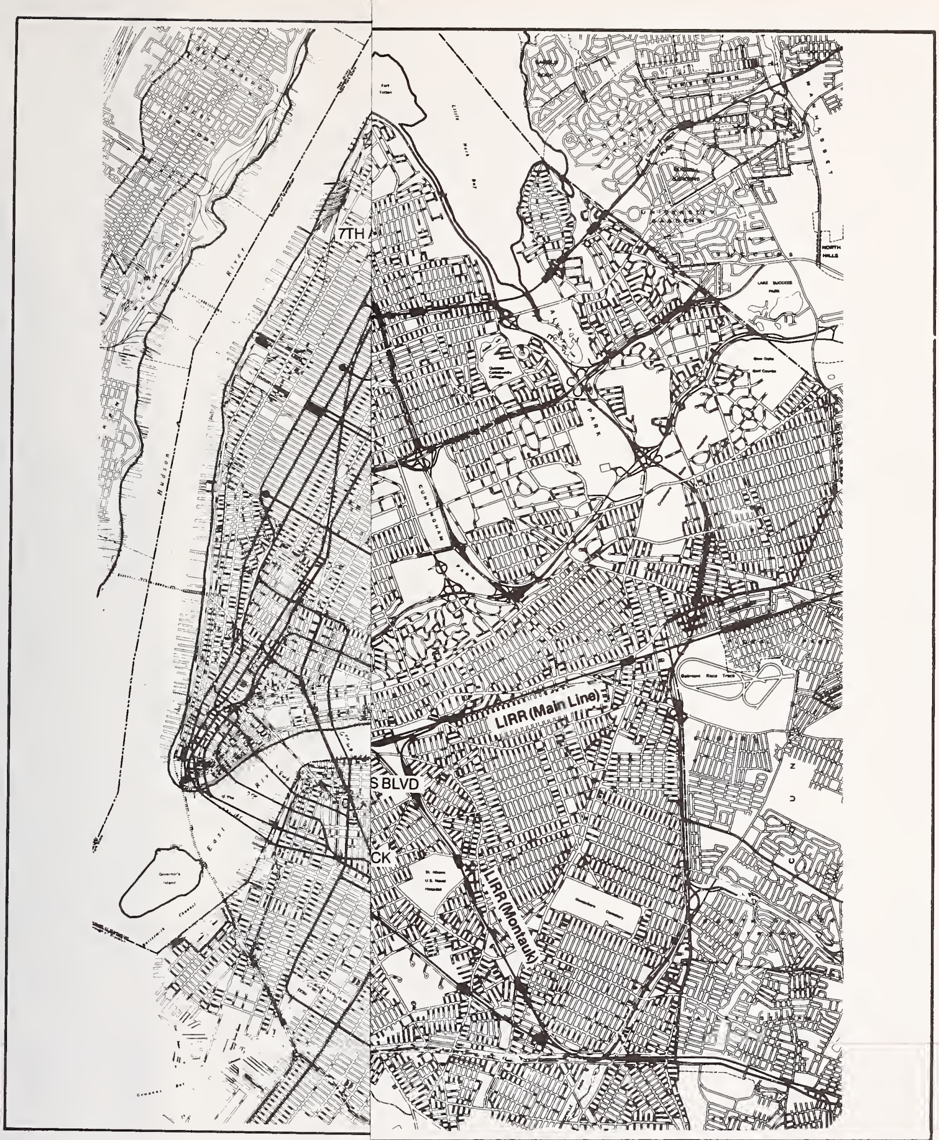
The lower level of this subway line connects to the existing elevated line on Jamaica Avenue at 127th Street. From this above grade connection, the line curves south at a declining grade, eventually going into a tunnel section west of the Van Wyck Expressway. The subway then curves east under Archer Avenue and the upper level subway and connects to the lower level of the new stations at Sutphin Boulevard and Parsons Boulevard. The lower level continues east to 160th Street where it terminates and does not follow the alignment of the upper level.

63rd Street Line. This subway line will connect Queens, Roosevelt Island and Manhattan through a new tunnel under the East River north of the Queensboro Bridge.

In Queens, the end of subway line construction is at 29th Street and 41st Avenue in Long Island City. From this terminus the subway proceeds west under 41st Avenue to a new station at 21st Street. Continuing west, the subway crosses under the east channel of the East River to a new station on Roosevelt Island. West of this station the subway crosses under the west channel of the East River and connects to a new two level station at Lexington Avenue. At the Lexington Avenue station, westbound trains will use the upper level platform and eastbound trains will use the lower level platform. Continuing west and then curving south under Central Park, the subway connects to the existing 6th Avenue and 7th Avenue subways.

2.2.1(b) Service Characteristics

In this alternative, the study's baseline, the upper and lower levels of the Archer Avenue subway in Jamaica as well as the 63rd Street subway in Manhattan and Long Island City are opened for service. The alternative includes only those facilities which currently exist or are under construction. It provides a baseline against which to compare those alternatives which include proposals for new facilities. The opening brings service to six new subway stations -- three



Legend

Route of new service

New station

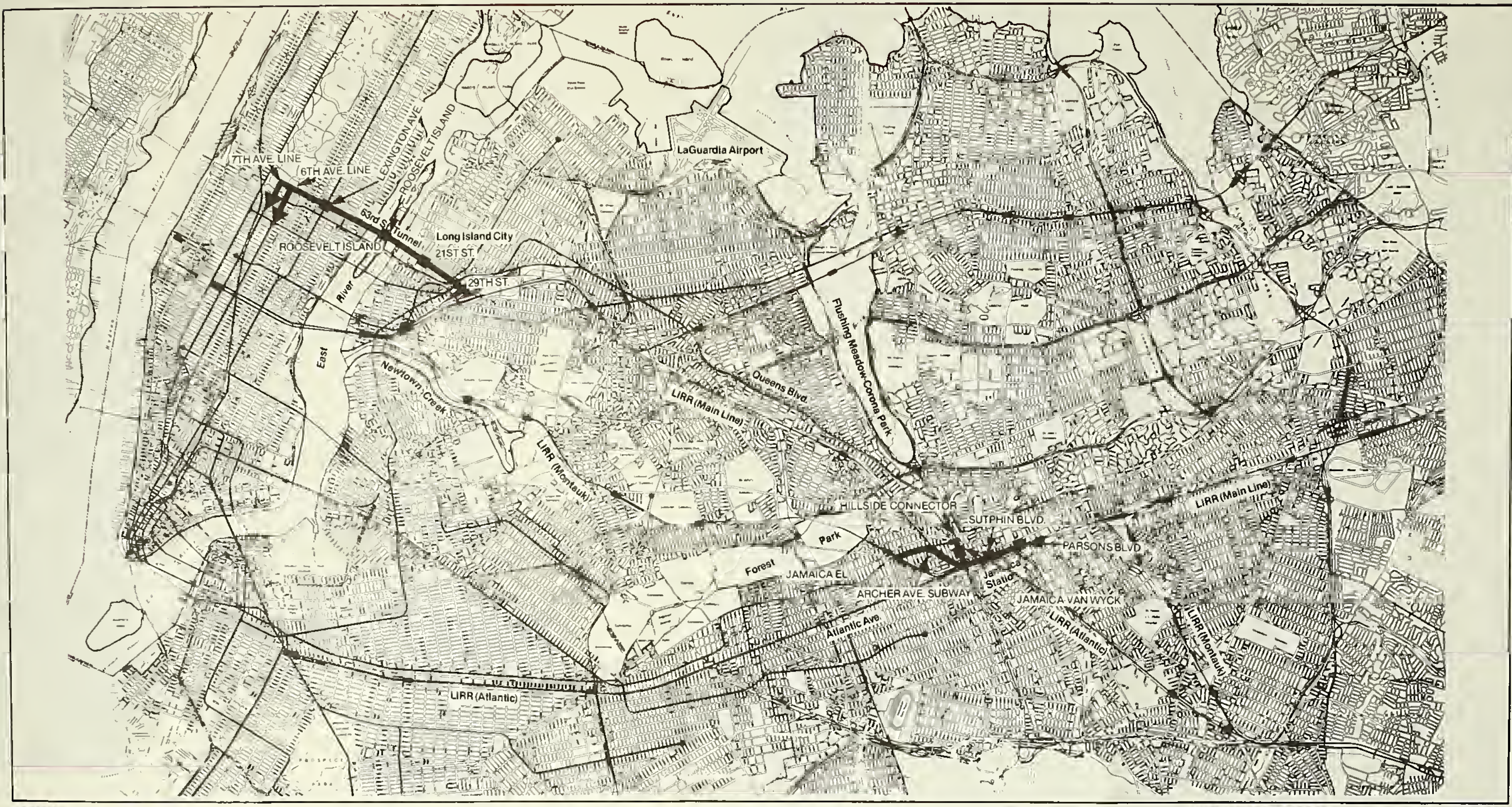
0 6000

Scale in Feet

N

NO ADDITIONAL CONSTRUCTION

Figure 2-1



Legend
Route of new service
■ New station

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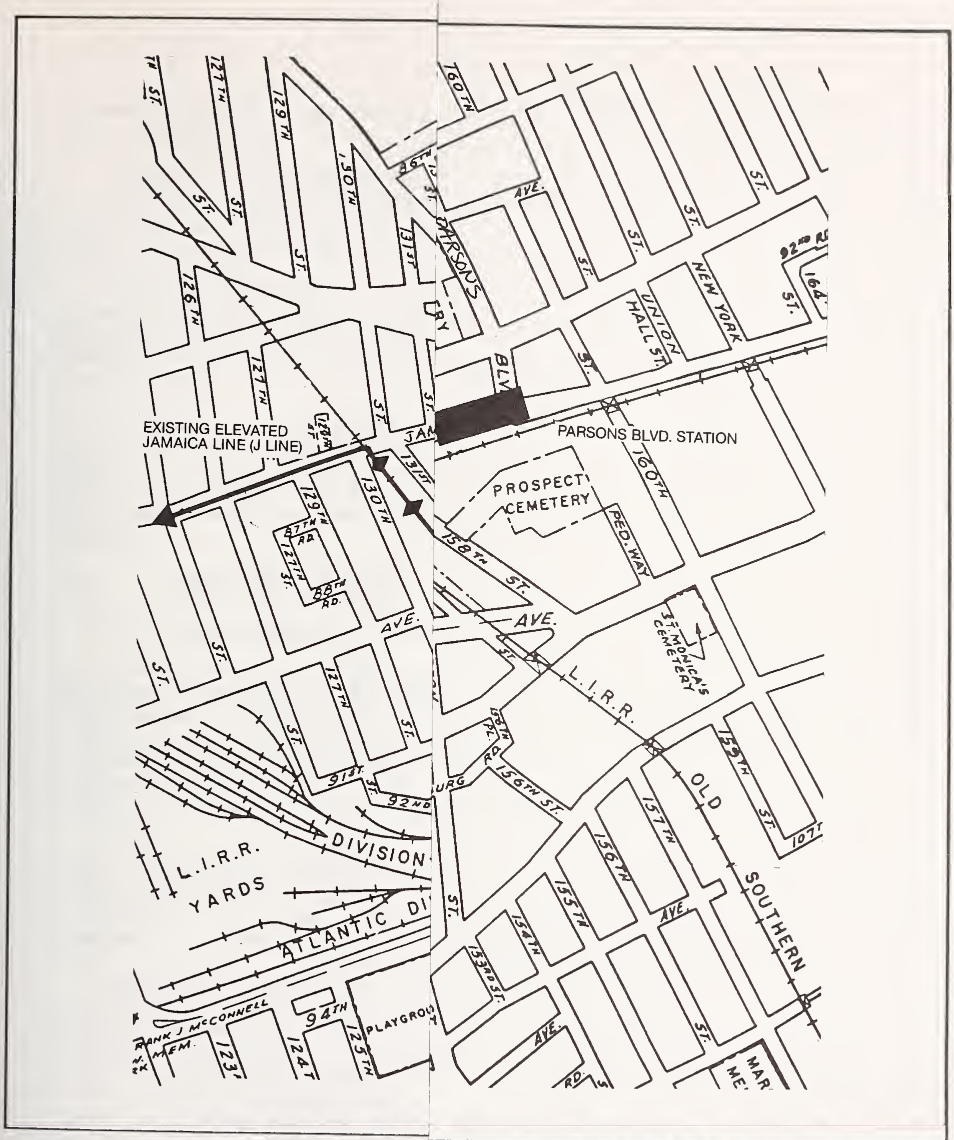
Scale in Feet
N

NO ADDITIONAL CONSTRUCTION

Figure 2-1



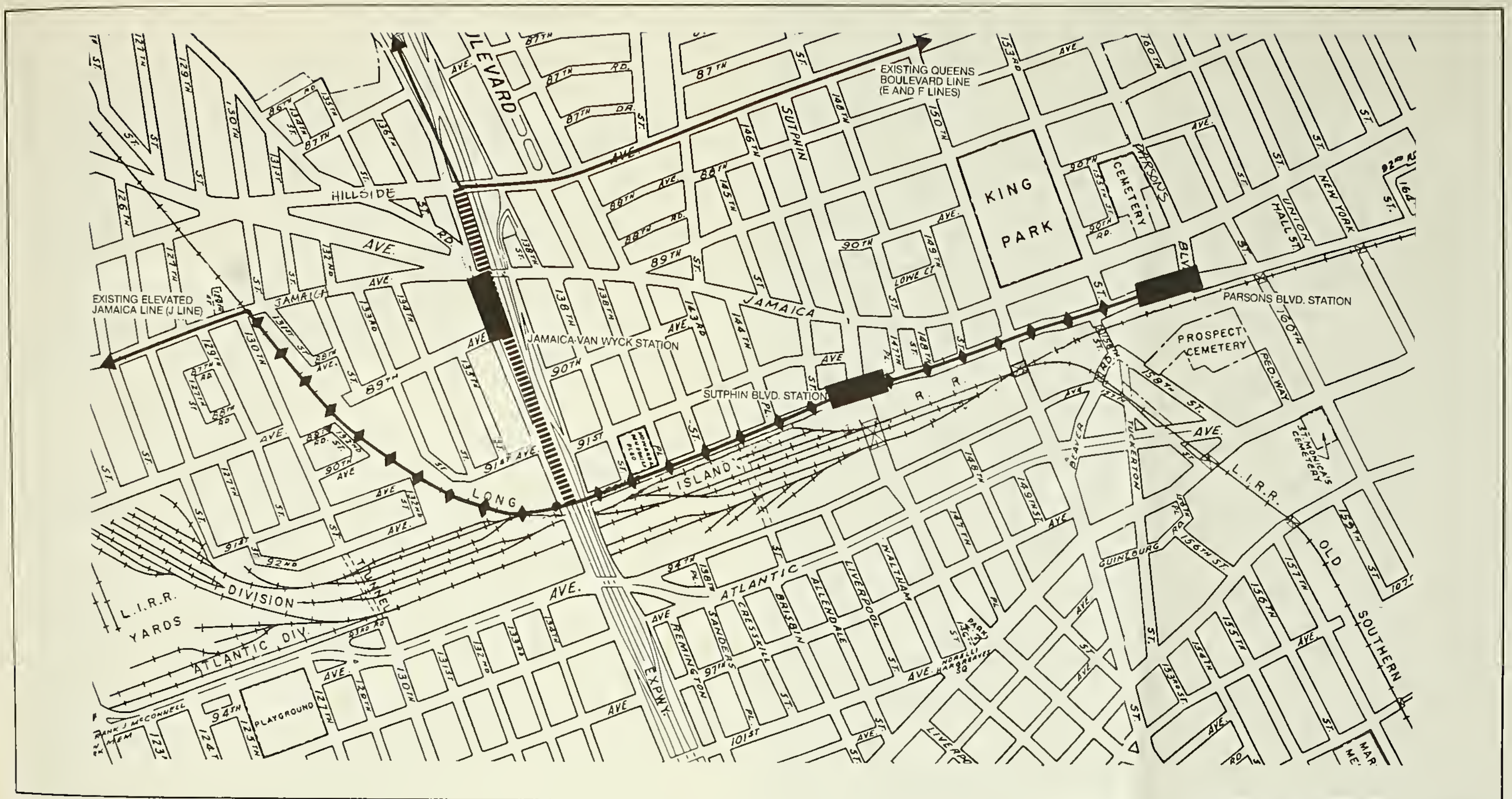
Legend

IIIIIIII Hillside connector

—◆— Archer Avenue subway

DETAIL OF ARCHER AVENUE SUBWAY

Figure 2-2



Legend
Hillside connector
Archer Avenue subway

DETAIL OF ARCHER AVENUE SUBWAY

Figure 2-2

in Jamaica, 21st Street in Long Island City, Roosevelt Island, and Lexington-63rd Street in Manhattan.

Subway Plan. Figure 2-3 is a schematic drawing of this alternative. Table 2-1 lists the No Additional Construction subway routings and stopping patterns for all Queens services considered in the study. Table 2-2 describes the subway service frequencies at four weekday times -- peak, midday, evening and night.

Bus Operating Plan. In the No Additional Construction alternative, the extensive feeder bus network serving eastern Queens and western Nassau County is altered to feed the new station at Archer Avenue in Jamaica. Table 2-3 summarizes the proposed feeder bus service. All the other bus routes in Queens stay the same.

In Jamaica, six bus routes are changed to feed the Parsons-Archer subway station rather than the 169th Street station of the Queens Boulevard line. In addition, four bus routes are altered so that they make stops at Archer Avenue and Parsons Boulevard, as well as feeding the Parsons Boulevard station of the Queens Boulevard line. None of the reroutings significantly affect bus trip distances.

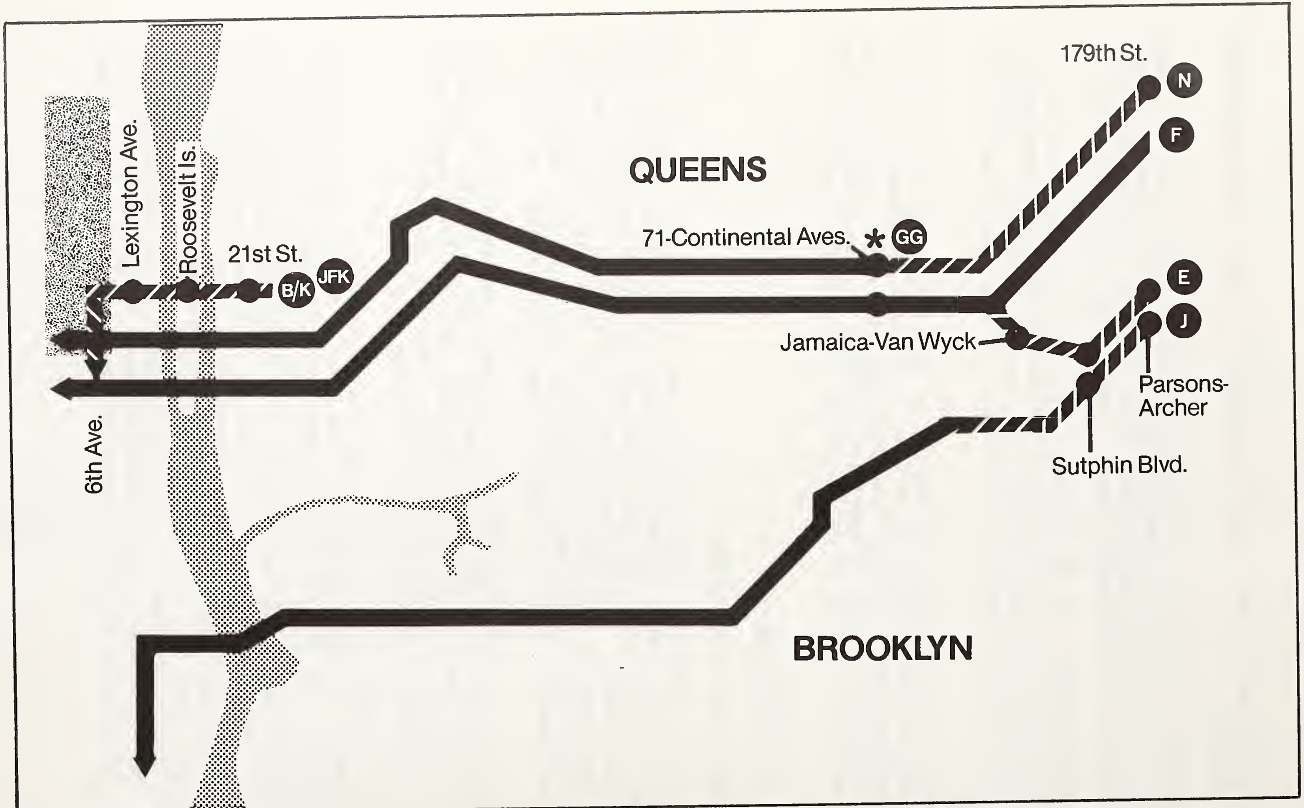
2.2.2 Queens Bypass Express

2.2.2(a) Physical Characteristics

Under this "benchmark" alternative, a two track rapid transit line approximately six miles long would be built between the end of the existing 63rd Street Tunnel at 29th Street and 41st Avenue and the Queens Boulevard line at 71st/Continental Avenues. One completely new station would be built and two existing stations would be expanded (see Figure 2-4). This transit line would be built on the south side of the Long Island Rail Road Main Line through the communities of Sunnyside, Woodside, Middle Village, Rego Park and Forest Hills.

Assuming that the preferred alternative is selected and agreed to by January 1985, preliminary engineering for this alternative would be complete by March 1987. Agency review would be finalized by January 1988, and final design would be complete by January 1991. The earliest date for the completion of construction and start of operations would be January 1998.

Alignment. Beginning at a below grade connection to the east end of the 63rd Street Tunnel, the subway passes under the existing Queens Boulevard subway line and connects to a new two track, center platform station at Northern Boulevard. Continuing from the Northern Boulevard Station the subway line rises in elevation and crosses under the Sunnyside Yard tracks and the tracks of the Long Island Rail Road Main Line. The subway curves to the east and continues to rise in elevation, breaking out of tunnel construction on the south side of the Long Island Rail Road Main Line at the Honeywell Street Viaduct. Traveling east, the transit line crosses over 43rd Street and meets the grade of the Long Island Rail Road Main Line on embankment along Barnett Avenue. In the area between the 39th Street Viaduct and 48th Street, connections will be made between the two rapid transit tracks and a new NYCTA storage yard in the eastern portion of the Sunnyside Yard.



Note: * Same as existing service

Legend
Existing Subway Service
Proposed Subway Service

Figure 2-3

NO ADDITIONAL CONSTRUCTION — PROPOSED SERVICE

Table 2-1

PEAK HOUR SUBWAY ROUTINGS AND STOPPING PATTERNS
NO ADDITIONAL CONSTRUCTION

		Queens				Manhattan			
Queens Terminal	Train	Queens Route	No. of Trains	Stop Pattern	Crossing	Manhattan Route	Stop Pattern	Brooklyn Route	Other Terminal
21 Street	B[1]	L.I. City	5	Local	63 Street	6 Avenue	Local	West End	Coney Island
21 Street	K[1]	L.I. City	3	Local	63 Street	6 Avenue	Local	-	2 Avenue
Parsons-Archer	E	Queens Blvd.	13	Express	53 Street	8 Avenue	Local	-	WTC
179 Street	F	Queens Blvd.	13	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	E	Queens Blvd.	2	Express	53 Street	8 Avenue	Local	-	WTC
71-Continental	F	Queens Blvd.	2	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	GG	Queens Blvd.	6	Local	-	-	-	Crosstown	Smith-9 Street
Parsons-Archer	J	Jamaica El.	12	Local	Williamsburg Bridge	Nassau-Chambers	Local	-	Broad Street
21 Street	JFK	L.I. City	3	Local	63 Street	6 Avenue	Express (on Local tracks)	Fulton	Howard Beach-JFK
179 Street	N	Queens Blvd.	14	Local	60 Street	Broadway	Local	Sea Beach -	Coney Island (8) Whitehall St (6)

B[1] and K[1] services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

Table 2-2

OPERATING FREQUENCIES
NO ADDITIONAL CONSTRUCTION

Service	Queens Terminal	Frequency in Trains per Hour: Peak AM/PM	Midday 12:00	Evening 9:00	Night 2:00	Remarks
B'	21 Street	5	6	5	3*	Present Terminal - 57 Street-6 Avenue. * B Shuttle from 50 Street-6 Avenue to 21 Street.
K'	21 Street	3	-	-	-	New Service to 2 Avenue, Manhattan
E	Parsons-Archer	15	6	5	3	Present Terminal - 179 Street. Two peak-hour put-ins at 71-Continental.
F	179 Street	15	6	5	3	No change from current schedules. After 7:17 p.m. runs local from 179 Street to 71-Continental. After 10:00 p.m. runs local from 179 Street to Queens Plaza. Two peak-hour put-ins at 71-Continental.
GG	71-Continental	6	6	5	3	After 10:23 p.m. terminates at Queens Plaza
J	Parsons-Archer	12	6	5	3	Present Terminal - Queens Boulevard
JFK	21 Street	3	3	3	-	Present Terminal - 57 Street/6 Avenue
N	179 Street	14*	6	-	-	Present Terminal - 71-Continental. Last train departs 179 Street at 7:17 p.m. Off-peak trains terminate at 71-Continental. * Coney Island (8) and Whitehall Street (6).

B' and K' services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

Table 2-3

FEEDER BUS ROUTING CHANGES
NO ADDITIONAL CONSTRUCTION, LOCAL CONNECTION, AND QUEENS BYPASS EXPRESS

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
Long Island City	Q39	9	9	0	No Change	Triboro Coach
	Q102	6	6	0	No Change	Steinway Transit
Jamaica	Q3A	36[1]	36	0	No Change	NYCTA
	Q4	20	20	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q4A	14	14	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5	20	20	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5A	12	12	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5AB	12	12	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q6	6[2]	6	0	No Change	Green Bus Lines
	Q8	8	8	0	No Change	Green Bus Lines
	Q40	6	6	0	No Change	Green Bus Lines
	Q42	6	6	0	No Change	NYCTA
	Q110	20	20	+0.3	Reroute to Parsons-Archer subway station via New York Blvd., Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q111	15	15	+0.1	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses

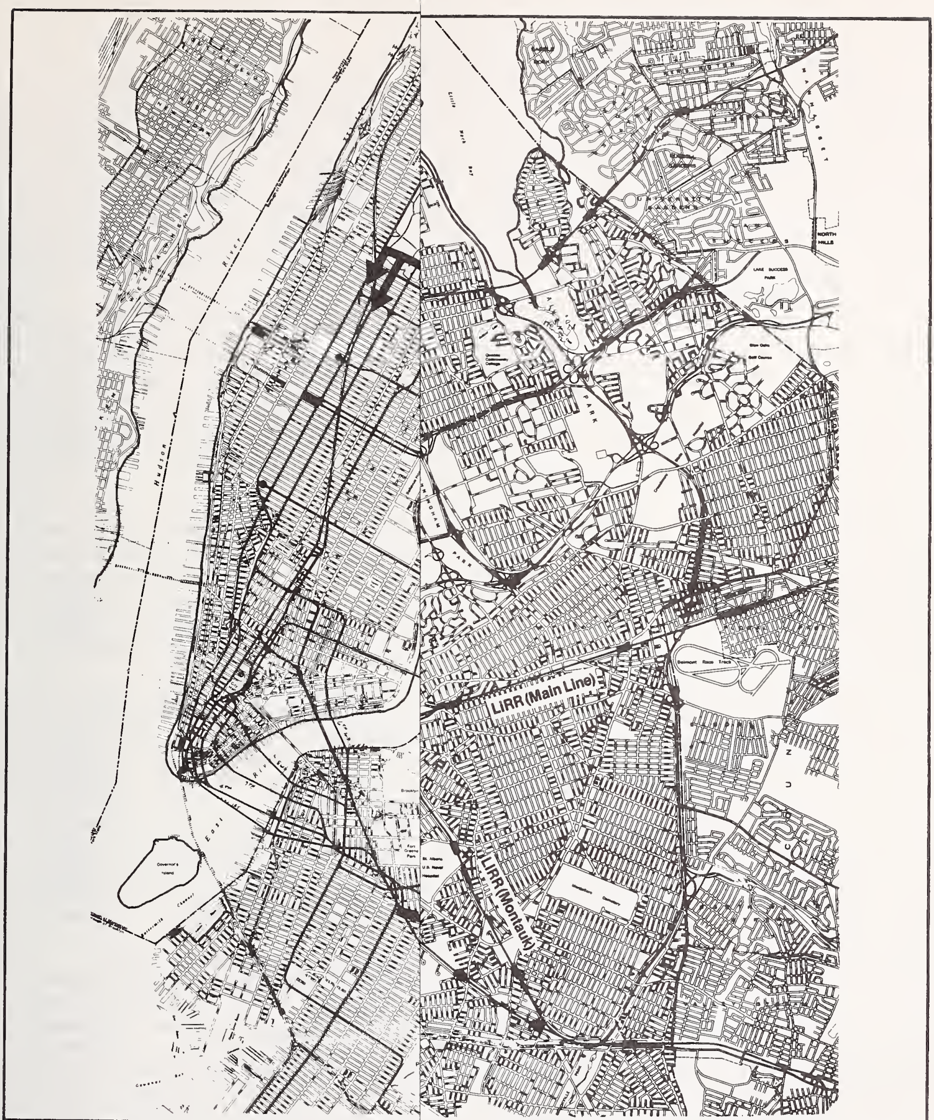
[1] 19 Q3A buses to 153 Street and 17 to 179 Street
[2] To Jamaica

Table 2-3 (Continued)

FEEDER BUS ROUTING CHANGES
NO ADDITIONAL CONSTRUCTION, LOCAL CONNECTION, AND QUEENS BYPASS EXPRESS

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
	Q112	8	8	+0.3	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q113	6	6	+0.1	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	N4	9	9	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	MSBA
	N5[1]	-	-	-	-	MSBA

[1] The N5 was to have been rerouted in the same manner as the N4. However, the N5 route was discontinued effective January, 1984.



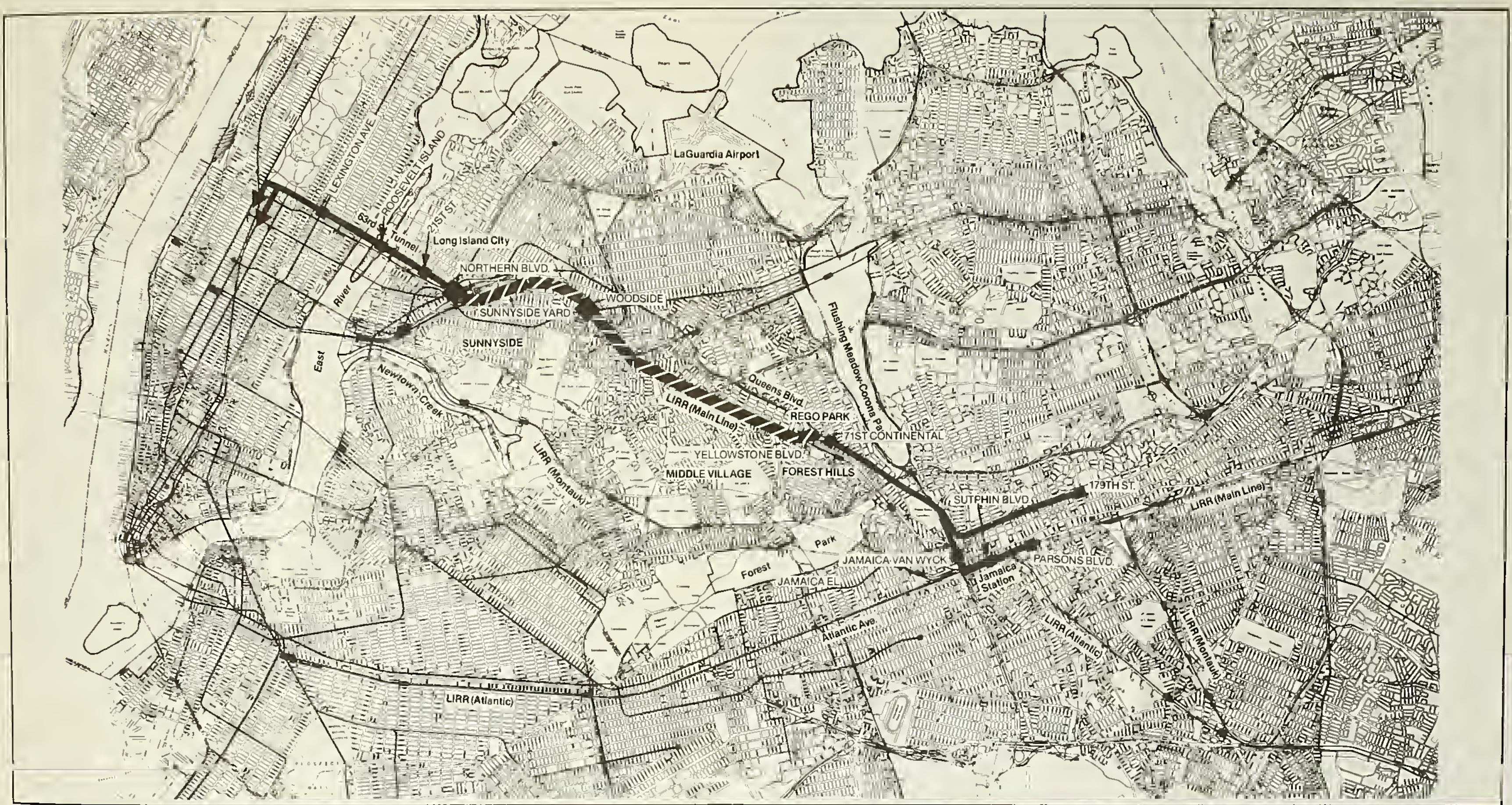
Legend

- Route of new service
- Construction
- Station

0 6000
Scale in Feet

N

QUEENS BYPASS EXPRESS Figure 2-4



Legend
Route of new service
Construction
Station

0 6000
Scale in Feet
N

QUEENS BYPASS EXPRESS Figure 2-4

Between 48th Street and Roosevelt Avenue, the transit line crosses over five streets before reaching Roosevelt Avenue where a new station would be constructed adjacent to the existing Long Island Rail Road Woodside Station. East of the Woodside station, the transit line remains parallel to and "at grade" with the LIRR Main Line for a distance of three miles through the communities of Middle Village, Rego Park and Forest Hills. In this segment, thirteen structures for roadways crossing over and under the transit line will have to be reconstructed, including major structures over the Brooklyn-Queens Expressway, Queens Boulevard, the Long Island Expressway and Woodhaven Boulevard.

Approximately 2000 feet west of Yellowstone Boulevard in Forest Hills, the new transit line begins descending from the grade of the LIRR Main Line and completely enters tunnel construction 500 feet west of Yellowstone Boulevard. Continuing to the east, the transit line curves to the north and crosses under the LIRR Main Line tracks, remaining below grade on the west side of Yellowstone Boulevard. Up to this location the eastbound and westbound track of the new line have been side by side; under Yellowstone Boulevard the configuration has the eastbound track "stacked" over the westbound track.

The subway continues along Yellowstone Boulevard for approximately ¼ mile where it curves eastward under the eastbound service road of Queens Boulevard to an expanded station at 71st-Continental Avenues. East of this station, the eastbound leg of the transit line rises and connects with the eastbound local track of the existing Queens Boulevard Line; the westbound leg passes completely under the Queens Boulevard line before rising and connecting with the existing westbound local track.

Stations. The Northern Boulevard Station would be built below grade and would be center loading with stairs and escalators from a mezzanine level to an island platform serving eastbound and westbound trains. A fare control building with direct, at grade access from Northern Boulevard, would be constructed on property owned by the Transit Authority between Northern Boulevard and the Sunnyside Yard. The fare control building will contain a token booth, turnstiles, escalators and stairs for access to the mezzanine level and an elevator for direct access to the platform for the handicapped and elderly. A below grade passageway would connect the mezzanine level of this station with the mezzanine of the adjacent Queens Plaza Station to provide for free passenger transfer. (Refer to Figure A.9-1 in the Appendix).

The Woodside Station would be built above grade at the same elevation of the adjacent Long Island Rail Road Woodside Station and below the existing station of the TA Flushing line. A fare control area with an at grade entrance from Roosevelt Avenue will provide direct access, with an escalator, stairway and elevator, to an island platform serving eastbound and westbound trains. This station will also serve as a major transfer point between the new transit line and the existing LIRR and TA Flushing line, #7 trains. The transfer would be accomplished by extension of the existing mezzanine, between the LIRR and Flushing line platforms, over the new platform with connecting stairways and an escalator. This interconnecting of the new transit line with the existing LIRR and TA facilities would give passengers several travel options during service disruptions.

The 71st-Continental Avenues Station would be built on the south side of the existing station and have three levels reaching approximately 50 feet below the Queens Boulevard eastbound service road. The first level below grade will be a mezzanine level which will connect to the existing station mezzanine and also contain a new fare control area. Access to the mezzanine from the street will be by two stairways and an elevator on the south side. The second level will contain the platform for the eastbound leg of the new transit line. This level will be connected to the mezzanine level by four (4) escalators, a stairway and an elevator. The third or lowest level will contain the platform for the westbound leg of the new transit line. This level will connect directly to the mezzanine level with two escalators and an elevator. There will also be two escalators and a stairway connecting the second and third levels.

Storage and Maintenance Facilities. Storage and maintenance facilities will be located west of the Woodside Station in the eastern portion of the Sunnyside Yard. The area of the proposed yard to be used for the new storage facility is owned by the National Railroad Passenger Corporation (Amtrak) and was formerly used by the Railway Express Agency. The yard would be constructed to store approximately 360 subway cars used on the new transit line.

2.2.2(b) Service Characteristics

The proposed Queens "super-express" route connects the two tracks of the 63rd Street Tunnel at their present 29th Street end-of-construction location with the Queens Boulevard line just east of 71st-Continental Avenues using two additional grade level tracks adjacent to the Long Island Rail Road Main Line from Sunnyside Yard to Rego Park. Super-express trains use the existing Queens Boulevard lines east of 71st-Continental Avenues and the Hillside connection to access both the Parsons-Archer and 179th Street Stations. Stations are located at Northern Boulevard, Woodside and 71st-Continental Avenues. A four-car pocket track is included approximately one mile east of the Northern Boulevard Station for turning JFK trains.

Subway Plan. Figure 2-5 is a schematic of this alternative. Table 2-4 lists the Queens Bypass Express subway routings and stopping patterns for all Queens services considered in this study. Table 2-5 describes the subway service frequencies at four weekday times -- peak, midday, evening and night.

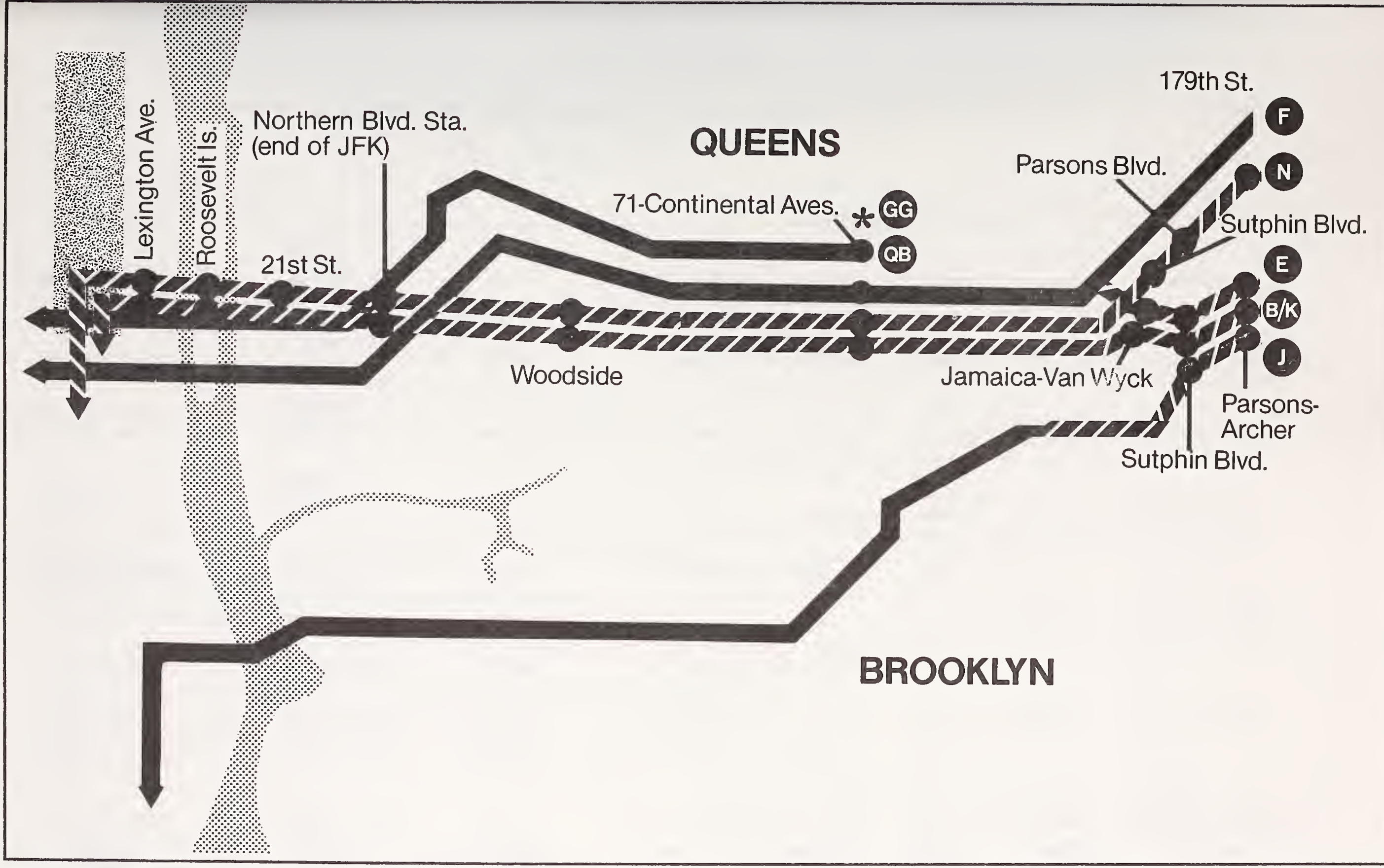
Bus Operating Plan. The proposed feeder bus service is the same as for the No Additional Construction alternative (Table 2-3).

2.2.3 Queens Boulevard Line Local Connection

2.2.3(a) Physical Conditions

Under this alternative, a short connection approximately 520 feet in length would be made between the east end of the completed 63rd Street Tunnel and the existing Queens Boulevard line local tracks under Northern Boulevard in Long Island City (see Figure 2-6).

Assuming that the preferred alternative is selected and agreed to by January 1985, preliminary engineering for this alternative would be complete by March



Note: * Same as existing service

Legend
Existing Subway Service
Proposed Subway Service

QUEENS BYPASS EXPRESS — PROPOSED SERVICE

Figure 2-5

Table 2-4

PEAK HOUR SUBWAY ROUTINGS AND STOPPING PATTERNS
QUEENS BYPASS EXPRESS

		Queens				Manhattan			
Queens Terminal	Train	Queens Route	No. of Trains	Stop Pattern	Crossing	Manhattan Route	Stop Pattern	Brooklyn Route	Other Terminal
71-Continental	QB	Queens Blvd.	14	Local	60 Street	Broadway	Local	Brighton -	Coney Island (8) Whitehall Street (6)
Parsons-Archer	E	Queens Blvd.	8	Express	53 Street	8 Avenue	Local	-	WTC
179 Street	F	Queens Blvd.	10	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	E	Queens Blvd.	2	Express	53 Street	8 Avenue	Local	-	WTC
71-Continental	GG	Queens Blvd.	6	Local	-	-	-	Crosstown	Smith-9 Street
Parsons-Archer	J	Jamaica El.	12	Local	Williamsburg Bridge	Nassau-Chambers	Local	-	Broad Street
Northern Boulevard	JFK	Queens Express Bypass	3	Local	63 Street	6 Avenue	Express (on Local tracks)	Fulton	Howard Beach-JFK
179 Street	N	Queens Express Bypass	14	Local	63 Street	Broadway	Express	Sea Beach	Coney Island
Parsons-Archer	B[1]	Queens Express Bypass	5	Local	63 Street	6 Avenue	Local	-	Coney Island
Parsons-Archer	K[1]	Queens Express Bypass	7	Local	63 Street	6 Avenue	Local	-	2 Avenue

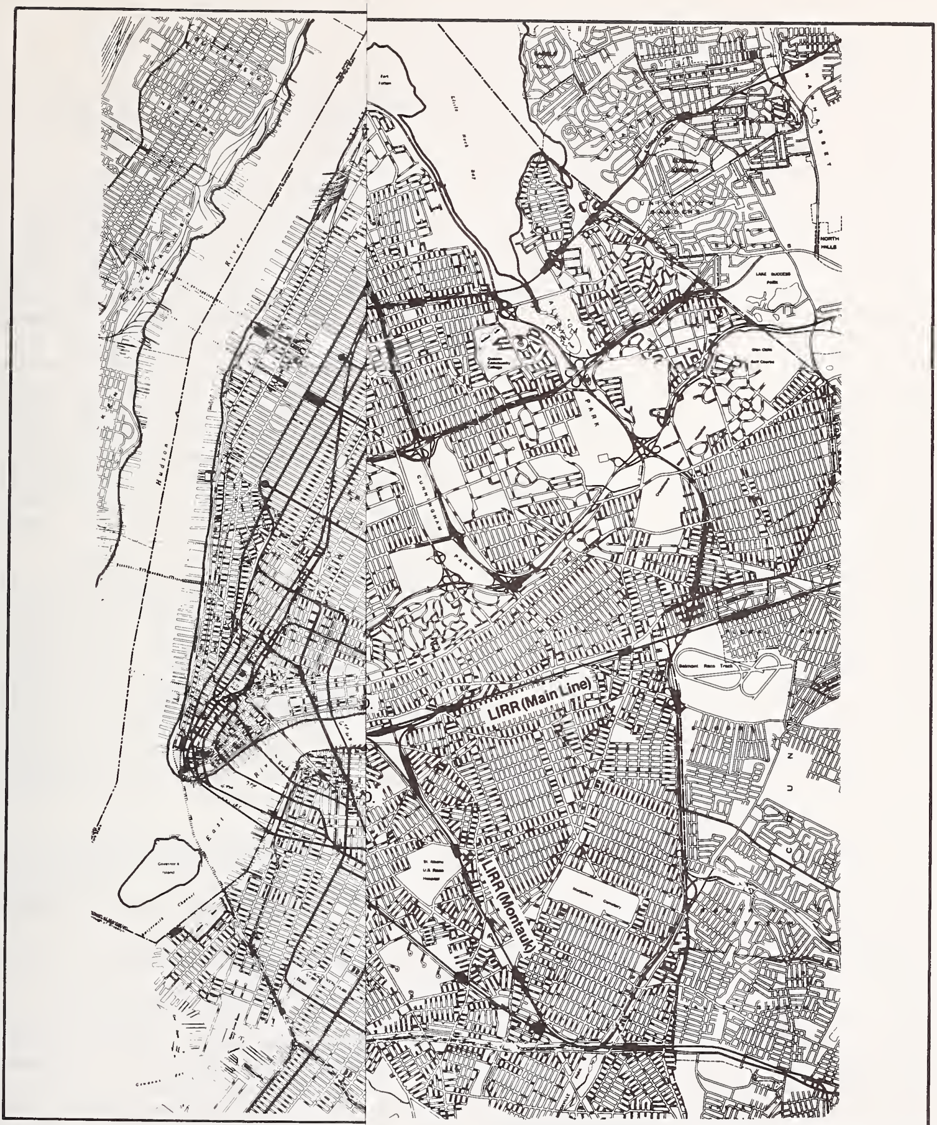
B[1] and K[1] services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

Table 2-5

OPERATING FREQUENCIES
QUEENS BYPASS EXPRESS

		Frequency in Trains per Hour				
Service	Queens Terminal	Peak AM/PM	Midday 12:00	Evening 9:00	Night 2:00	Remarks
B[1]	Parsons-Archer	5	6	5	3*	* B Shuttle from 50 Street-6 Avenue to Northern Blvd. via Queens Bypass Express. Off-peak trains terminate at 71-Continental.
K[1]	Parsons-Archer	7	-	-	-	New service to 2 Avenue, Manhattan.
N	179 Street	14*	6	-	-	Present Terminal - Continental Avenue. Last train departs at 7:17 p.m. Off-peak trains terminate at 71-Continental. * Coney Island (14).
JFK	Northern Blvd.	3	3	3	-	Present Terminal - 57 Street-6 Avenue. Tail track in vicinity of Laurel Hill Road; no turning track at station.
E	Parsons-Archer	10	6	5	3	Service reduction in peak period. Present Terminal - 179 Street. Two peak-hour trains put-in at 71-Continental.
J	Parsons-Archer	12	6	5	3	Present Terminal - Queens Boulevard.
F	179 Street	10	6	5	3	Service reduction in peak period. Runs local from 179 Street to 71-Continental after 7:17 p.m. After 10:00 p.m. runs local from 179 Street to Queens Plaza.
GG	71-Continental	6	6	5	3*	* After 10:23 p.m. terminates at Queens Plaza.
QB	71-Continental	14	-	-	-	Peak service only, similar to current N in Queens. A total of 7 southbound morning trains (6 in the peak hour) terminate at Whitehall Street, all others terminate at Coney Island via the Brighton line. Northbound morning service includes 8 trains, at 10 minute headways, departing Coney Island, 6 to 71-Continental and 2 to Astoria. Evening peak service is reverse of morning.

B[1] and K[1] services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

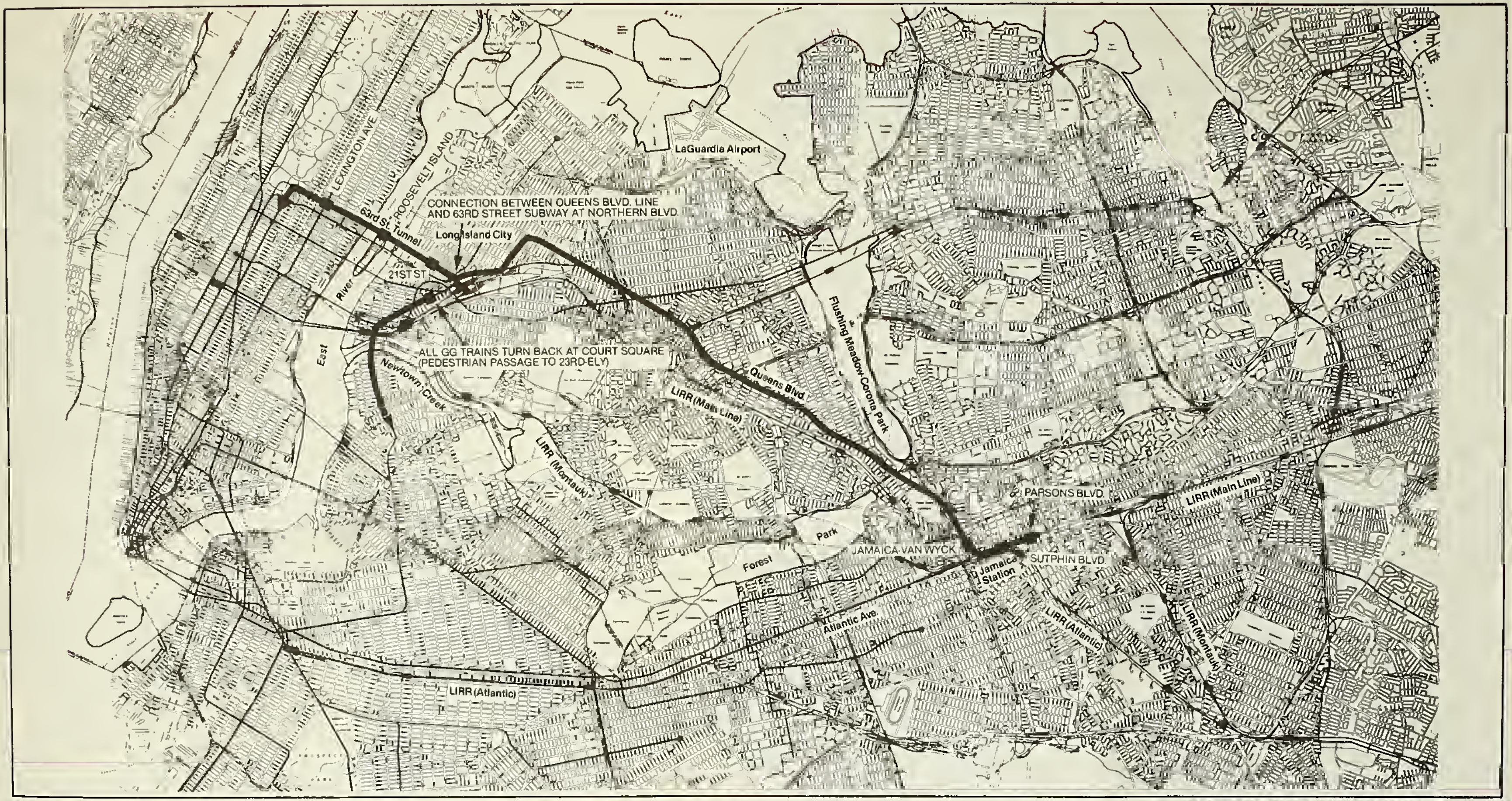


Legend
Route of new service
Station

0 6000
Scale in Feet

N

QUEENS BLVD. LINE-LOCAL CONNECTION Figure 2-6



Legend

Route of new service

Station

0 6000

Scale in Feet

N

QUEENS BLVD. LINE-LOCAL CONNECTION Figure 2-6

1986. Agency review would be finalized by October 1986, and final design would be complete by January 1989. The earliest date for the completion of construction and start of operations would be January 1993.

Alignment. Beginning at the end of the tunnel under 29th Street and 41st Avenue, the track connection will curve sharply to the north to join the Queens Boulevard line in the vicinity of Honeywell Street and Northern Boulevard. Because of physical constraints on the alignment of the connection, the eastbound and westbound segments will be constructed in two separate tunnels. The eastbound segment will descend and cross completely under the existing five track Queens Boulevard line while curving sharply toward the north. After clearing the side of the existing structure, the eastbound connection will rise under the east sidewalk on Northern Boulevard parallel to the existing structure. When the elevations of the new eastbound connection and the exisiting eastbound local track are the same, the two tracks will merge at a point west of the 36th Street Local Station near Honeywell Street. The westbound segment will diverge from the existing westbound local track in the vicinity of 31st Street and Northern Boulevard. The connection, under the west sidewalk of Northern Boulevard will descend and curve sharply to the west to join with the end of the 63rd Street Tunnel. (Refer to Figure A.9-2 in the Appendix).

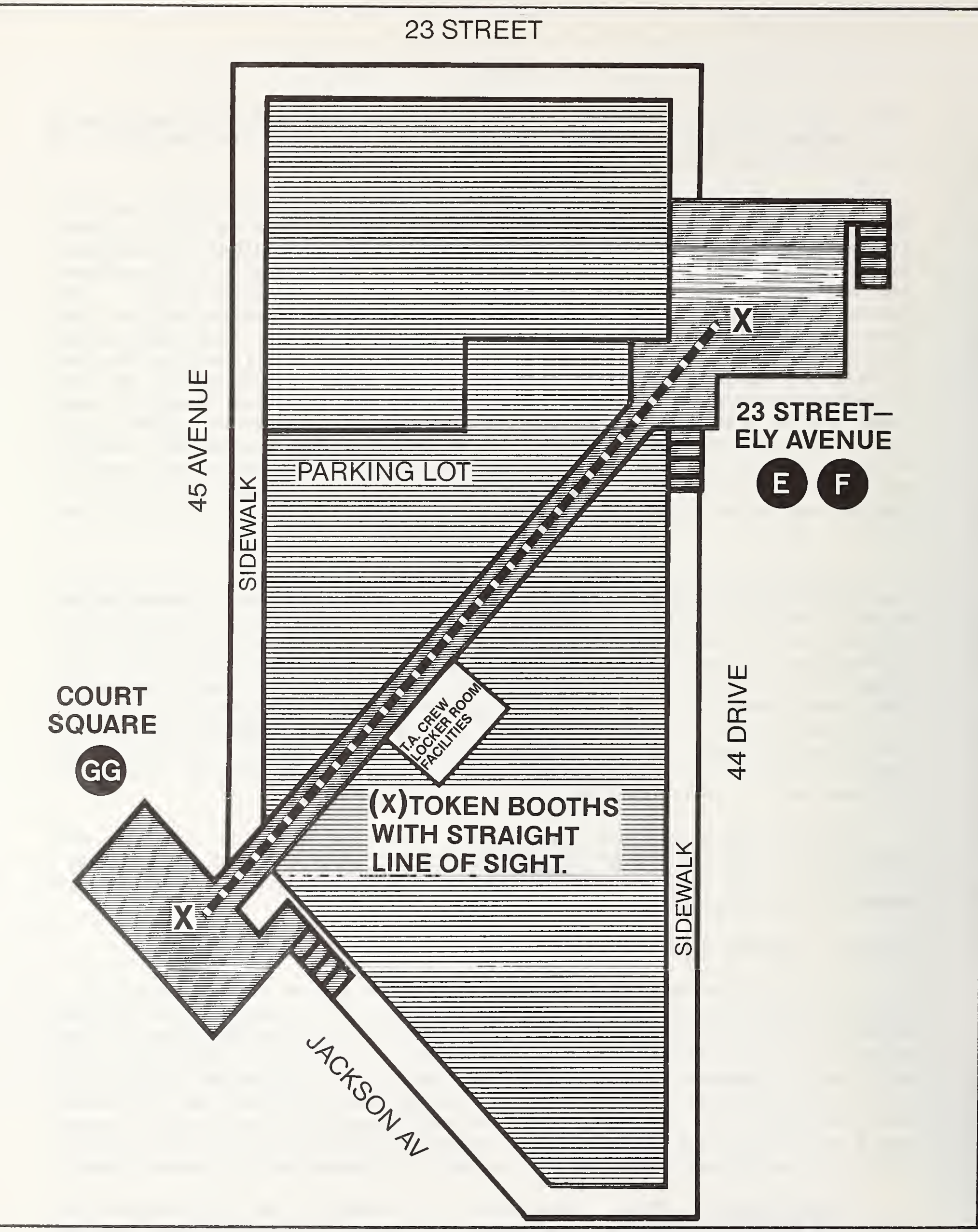
Additional Features. The operating plan for this alternative will require the termination of the GG service at the Court Square Station. Passengers who normally used the Queens Plaza Station to transfer between the GG service and the E/F service will continue to have this free transfer possibility under this alternative. An underground passageway will be constructed between the Court Square Station on the GG line and the 23rd Street/Ely Avenue Station on the E/F line (see Figure 2-7). The passageway will be a straight line connection between the mezzanine areas of the two stations and will be well lighted with straight line sight distances to manned token booths. Also, since this will be the terminal of the GG service, train crew facilities will be constructed adjacent to the passageway. (Refer to Figure A.9-3 in the Appendix).

Storage and Maintenance Facilities. The trains to be used in this alternative will be stored in the existing Transit Authority yard at 38th Street in Brooklyn. The yard will be modified to provide storage space for 219 cars needed for the planned service.

2.2.3(b) Service Characteristics

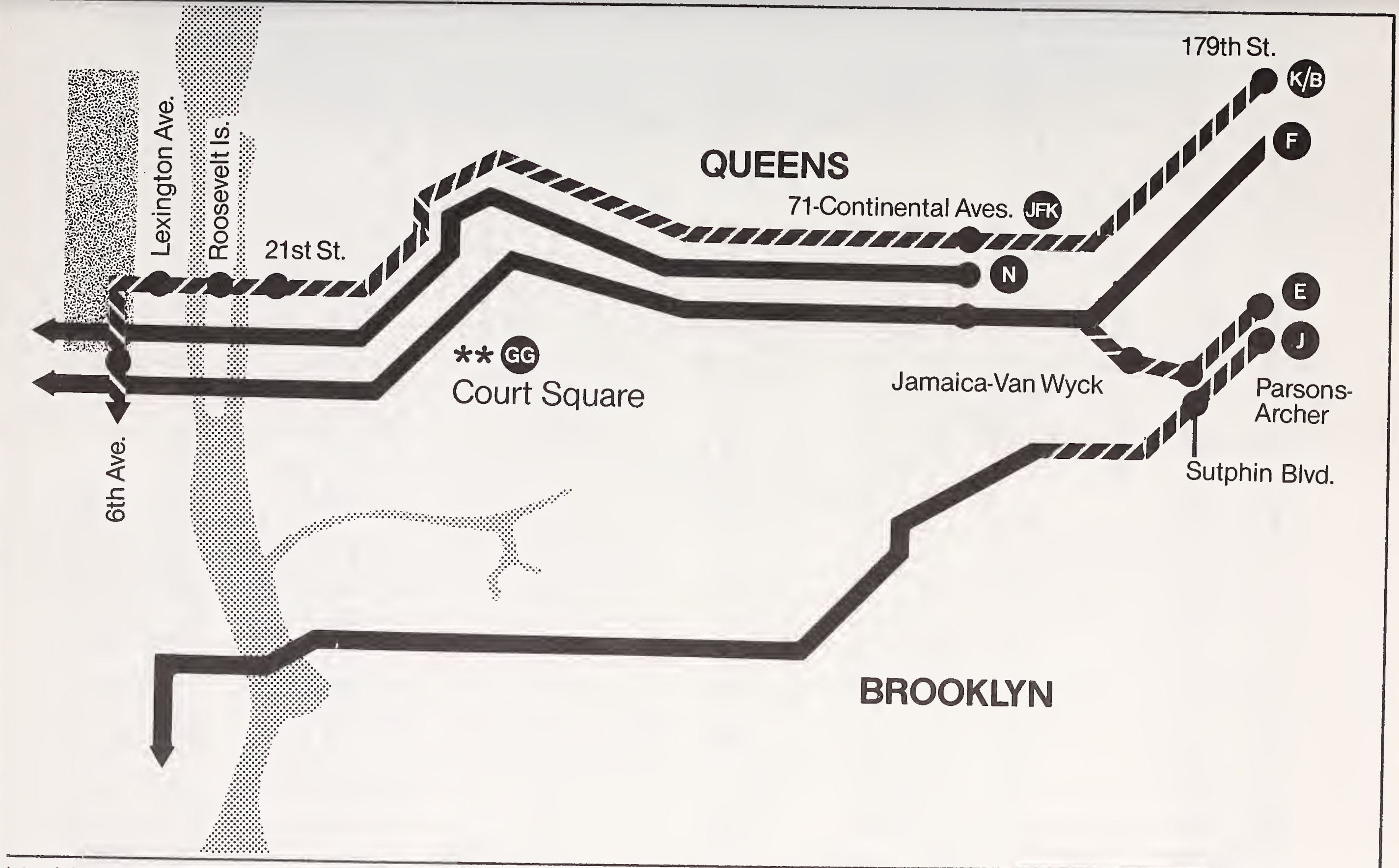
In this alternative, the two-track 63rd Street Tunnel line is connected to the local tracks of the Queens Boulevard line between the Queens Plaza and 36th Street Stations. This construction is in addition to those facilities already committed, as described in the No Additional Construction alternative. In addition, a passageway would connect two stations in Long Island City, the GG Court Square Station and the 23rd Street-Ely Avenue Station on the Queens Boulevard line. The 300 foot connection would provide a free transfer between the E and F lines and the GG service, which will terminate at Court Square to permit the new Queens Boulevard local service to access the 63rd Street Tunnel.

Subway Operating Plan. Figure 2-8 is a schematic of this alternative. Table 2-6 describes the Queens Boulevard Line Local Connection subway routings



QUEENS BOULEVARD LINE — LOCAL CONNECTION — COURT SQUARE AREA

Figure 2-7



lote: ** Operating between Court Square and Brooklyn

Legend
Existing Subway Service
Proposed Subway Service

QUEENS BOULEVARD LINE — LOCAL CONNECTION — PROPOSED SERVICE

Figure 2-8

Table 2-6

PEAK HOUR SUBWAY ROUTINGS AND STOPPING PATTERNS
QUEENS BLVD. LINE LOCAL CONNECTION

		Queens				Manhattan			
Queens Terminal	Train	Queens Route	No. of Trains	Stop Pattern	Crossing	Manhattan Route	Stop Pattern	Brooklyn Route	Other Terminal
179 Street	B[1]	Queens Blvd.	5	Local	63 Street	6 Avenue	Local	West End	Coney Island
179 Street	K[1]	Queens Blvd.	7	Local	63 Street	6 Avenue	Local	-	2 Avenue
Parsons-Archer	E	Queens Blvd.	13	Express	53 Street	8 Avenue	Local	-	WTC
179 Street	F	Queens Blvd.	13	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	E	Queens Blvd.	2	Express	53 Street	8 Avenue	Local	-	WTC
71-Continental	F	Queens Blvd.	2	Express	53 Street	6 Avenue	Local	Culver	Coney Island
Court Square	GG	Crosstown	6	Local	-	-	-	Crosstown	Smith-9 Street
Parsons-Archer	J	Jamaica El.	12	Local	Williamsburg Bridge	Nassau-Chambers	Local	-	Broad Street
71-Continental	JFK	Queens Blvd.	3	Express (on Local tracks)	63 Street	6 Avenue	Express (on Local tracks)	Fulton	Howard Beach-JFK
71-Continental	N	Queens Blvd.	14	Local	60 Street	Broadway	Local	Sea Beach -	Coney Island (8) Whitehall St. (6)

B[1] and K[1] services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

and stopping patterns for all Queens services considered in this study. Table 2-7 describes the subway service frequencies at four weekday times -- peak, midday, evening and night.

Bus Operating Plan. Proposed and existing bus service is identical to the operations detailed in the No Additional Construction alternative (refer to Table 2-3).

2.2.4 Subway/LIRR-Montauk Transfer

2.2.4(a) Physical Conditions

This alternative will combine services of the Long Island Rail Road and the Transit Authority, enabling passengers to travel from southeast Queens through the 63rd Street Tunnel into midtown Manhattan (see Figure 2-9).

This alternative makes use of the Montauk Branch of the LIRR which is approximately eight and a half miles long from Sunnyside Yard to Jamaica Station. Under this alternative all Queens-oriented service would extend beyond Jamaica Station on two routes, each approximately three miles long. One route would be along the Main Line to Queens Village, and the other would be along the Atlantic Branch to Rosedale.

Assuming that the preferred alternative is selected and agreed to by January 1985, preliminary engineering for this alternative would be complete by October 1986. Agency review would be finalized by June 1987, and final design would be complete by October 1989. The earliest date for the completion of construction and start of operations would be January 1995.

Alignment. Beginning at the east end of the 63rd Street Tunnel below 29th Street in Long Island City, a two track segment of subway tunnel will be built curving south under the Sunnyside Yard. The tunnel will cross under the existing Queens Boulevard subway line at Northern Boulevard, rising in elevation beneath private property and several tracks on the west side of the LIRR Yard 'A' freight classification facility. Continuing to rise in elevation, the connection breaks out of tunnel construction west of the Queens Boulevard overpass. At this point, the two tracks are in an open cut and continue south to the lower level of a new station near Thomson Avenue where they will terminate. Transit Authority trains will be operated from the lower level of the Thomson Station, through the described connection to the 63rd Street Tunnel and then into Manhattan.

The upper level of the Thomson Avenue station will be the terminal for Long Island Rail Road trains. The two tracks from the station's upper level will continue south and join with the LIRR-Montauk Cut-off south of Thomson Avenue. LIRR passenger trains would continue east along the refurbished and electrified Montauk Branch tracks through the communities of Long Island City, Maspeth, Ridgewood, Middle Village, Glendale and Richmond Hill. Trains will stop at the existing Richmond Hill Station which is approximately 7.5 miles from the Thomson Station in Long Island City.

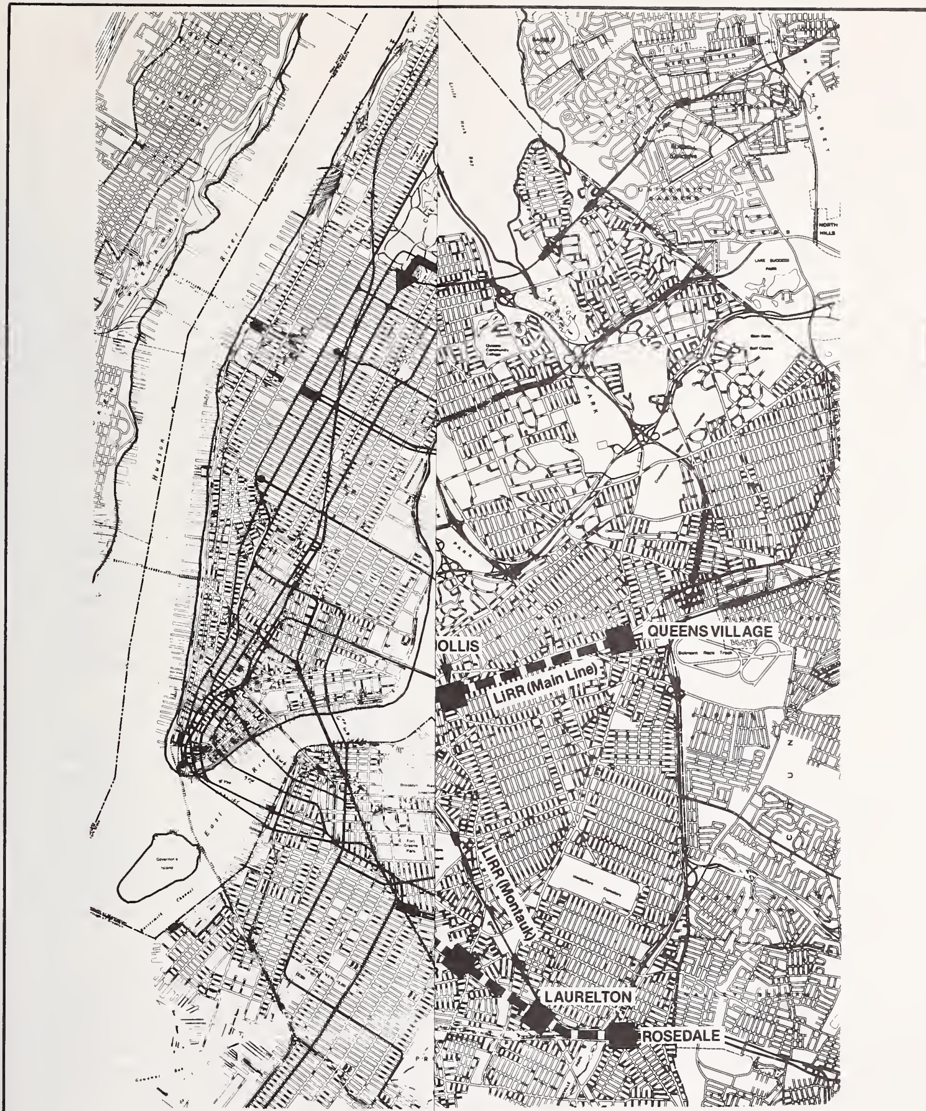
Continuing eastward from the Richmond Hill Station, trains using the LIRR Atlantic Branch will stop at the existing Jamaica Station while Main Line-bound

Table 2-7

OPERATING FREQUENCIES
QUEENS BLVD. LINE LOCAL CONNECTION

Service	Queens Terminal	Frequency in Trains per Hour				Remarks
		Peak AM/PM	Midday 12:00	Evening 9:00	Night 2:00	
B'	179 Street	5	6	5	3*	* B Shuttle from 50 Street-6 Avenue to 21 Street. Off-peak trains terminate at 71-Continental.
K'	179 Street	7	-	-	-	New service to 2 Avenue, Manhattan
GG	Court Square	6	6	5	3	All trains terminate at Court Square.
N	71-Continental	14*	6	-	-	No change from current schedules. Last train departs Continental Avenue at 7:17 p.m. * Coney Island (8) and Whitehall Street (6).
E	Parsons-Archer	15	6	5	3	Present Terminal - 179 Street. Two peak hour trains put-in at 71-Continental.
F	179 Street	15	6	5	3	After 10:00 p.m. runs local Queens Plaza - 179 Street. Two peak-hour trains put-in at 71-Continental.
J	Parsons-Archer	12	6	5	3	Present Terminal - Queens Boulevard
JFK	71-Continental	3	3	3	-	Present Terminal - 57 Street-6 Avenue

B' and K' services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.



Legend

New subway line

New service on LIRR line

Stations

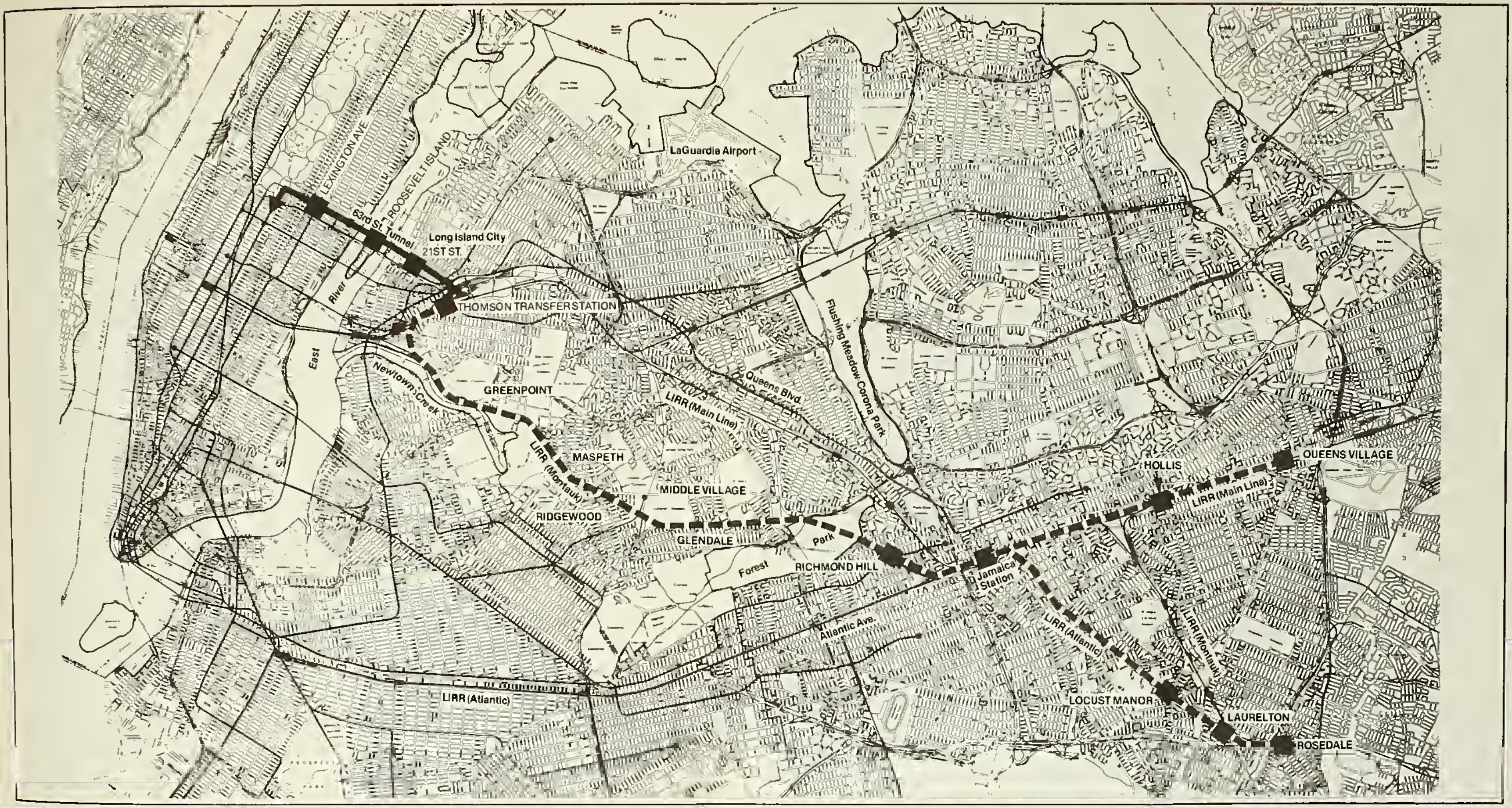
0 6000

Scale in Feet

N

SUBWAY/LIRR-MONTAUK TRANSFER

Figure 2-9



Legend
New subway line
New service on LIRR line
Stations

0 6000
Scale in Feet
N

SUBWAY/LIRR-MONTAUK TRANSFER Figure 2-9

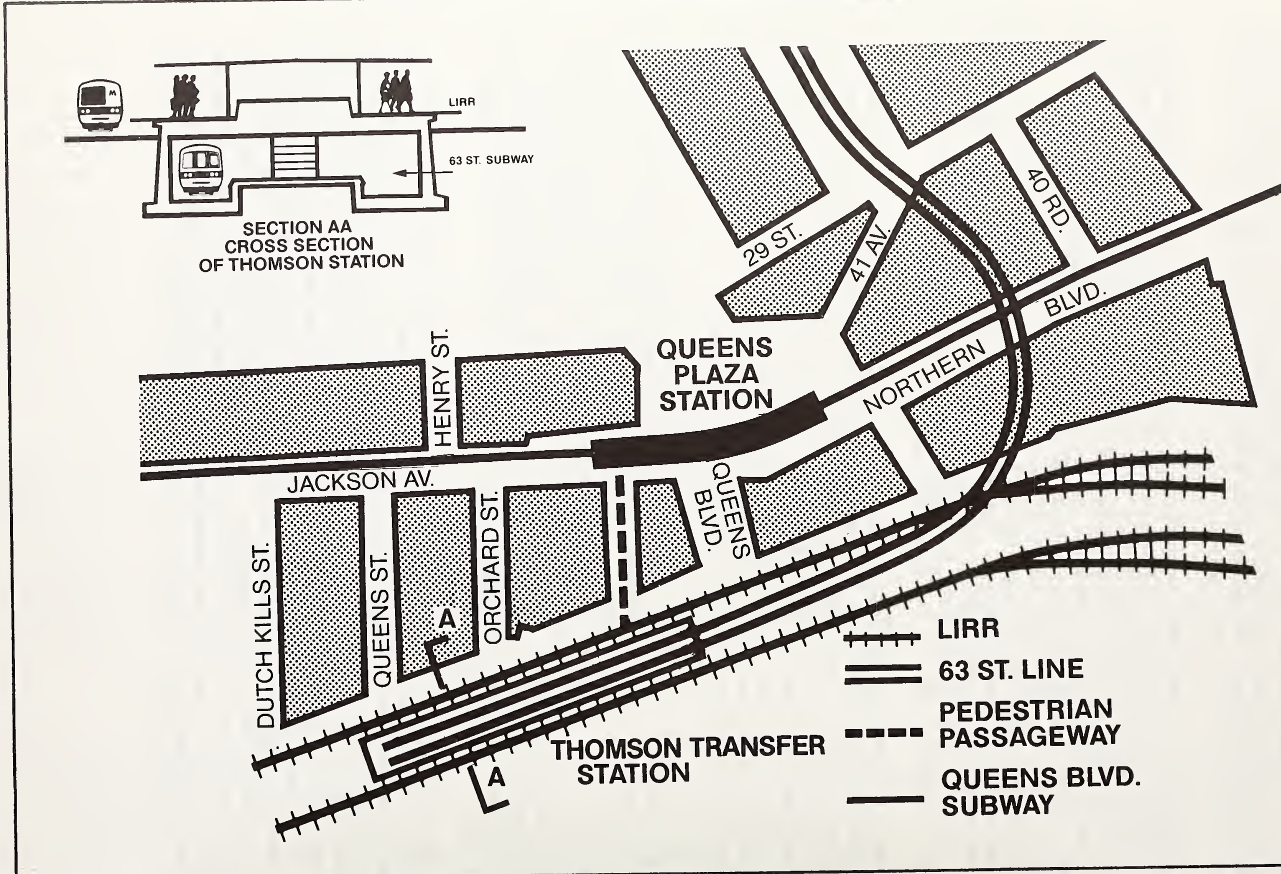
trains will bypass the station. Trains on the Main Line will use a single track on the south side, making a stop at Hollis before arriving at a terminal at the Queens Village Station. On the Atlantic Branch, trains will make stops at Locust Manor, Laurelton and at Rosedale.

Stations. A two level station will be constructed in the Sunnyside Yard near Thomson Avenue enabling passengers to transfer between LIRR and TA services (see Figure 2-10). The upper level will have side platforms serving two LIRR tracks which will be at the existing ground elevation of the Sunnyside Yard. The lower level will be in an open cut having a center platform serving the two TA tracks. The two upper level platforms will be connected together at four locations over the open cut; three of these "bridge" locations will contain fare control areas, stairways and escalators for vertical circulation and an elevator for the handicapped and elderly. The lower level platform will be connected to the nearby Queens Plaza Station through an underground passageway. This will provide for greater operational flexibility in the event of a service disruption. (Refer to Figures A.9-4 to A.9-6 in the Appendix).

The existing elevated LIRR Station at Richmond Hill will be refurbished for use under this alternative. The length and width of the existing platform is adequate; however, cracking and unevenness of the surface requires the installation of a new precast deck. The two deteriorated stairways will be replaced and a stairway will be added from street level up to the platform on the west side of Hillside Avenue. The open areas below the station near the stairways will be enclosed to form passenger waiting areas and the elevated platform will be provided with a canopy and windscreens.

The existing LIRR stations at Hollis and Queens Village will be utilized in this alternative. The south side or eastbound platforms at these two stations will be reconstructed. Currently these are "side" platforms; they will be converted to "island" platforms enabling passengers to board trains on an auxiliary track adjacent to the platforms. At both stations, canopies, windscreens and lighting will be installed and at the Queens Village Station a new stairway and elevator will be provided at the east end of the platform. At the Hollis Station, new curbing and sidewalk will be installed on the north side of 99th Avenue to serve as a pick-up and drop-off area for passengers. (Refer to Figures A.9-7 and A.9-8 in the Appendix).

The existing stations at Locust Manor, Laurelton and Rosedale will be refurbished with new canopies, windscreens and lighting. At the Locust Manor Station, near Rochdale Village, an off-street pick-up and drop-off area will be constructed on the east side of the station off of Farmers Boulevard. A new passageway under the two existing tracks will connect the off-street area with the two station platforms. At Laurelton, the existing parking lot on the east side of the station will be converted for use as a pick-up and drop-off area. A new passageway under the existing westbound track will connect the off-street area with the center island platform. At the Rosedale Station, a portion of the existing parking lot on the north side of the station will be used as a drop-off and pick-up area. The existing passageway from this area to the platform will be upgraded with additional lighting and architectural finishes. (Refer to Figure A.9-9 in the Appendix).



SUBWAY/LIRR MONTAUK TRANSFER — THOMSON TRANSFER STATION AREA Figure 2-1

Storage and Maintenance Facilities. Separate storage facilities will be provided for the Transit Authority and Long Island Rail Road trains used in this alternative. TA trains will be stored in the existing lay-up tracks at the Ninth Avenue Station in Brooklyn. Long Island Rail Road trains will be stored in the Sunnyside Yard and in a yard west of the Queens Village Station on the Main Line. At the Queens Village yard, existing "team" freight tracks and unloading facilities will be removed and new tracks installed to store six eight-car LIRR trains. In the Sunnyside yard, storage will be provided for five trains.

Substations. The Montauk Transfer alternative will require the installation of four substations (see Figure 2-11). These facilities will be constructed in existing railroad right-of-way and will not require property acquisition. Figures 2-12 and 2-13 show typical designs for the proposed substations. Depending on the configuration of the available space, either a side-by-side or an end-to-end design will be used.

Grade Separated Crossings. At the present time there are eight locations where vehicles cross the Montauk Branch tracks. Under this alternative, all the existing grade crossings will be closed so that pedestrians and vehicles will not be exposed to the new passenger trains (see Figure 2-14). Access to the properties now served by the grade crossings will be maintained by bridges over the Montauk tracks and new access roads. A listing of the affected grade crossings to be closed and a description of the method of maintaining access to properties is as follows:

- Greenpoint Avenue - Construct an elevated structure over the tracks from Review Avenue east of the Greenpoint Avenue Bridge connecting to an existing access road on the south side of the railroad. (Refer to Figures A.9-10 and A.9-11 in the Appendix).

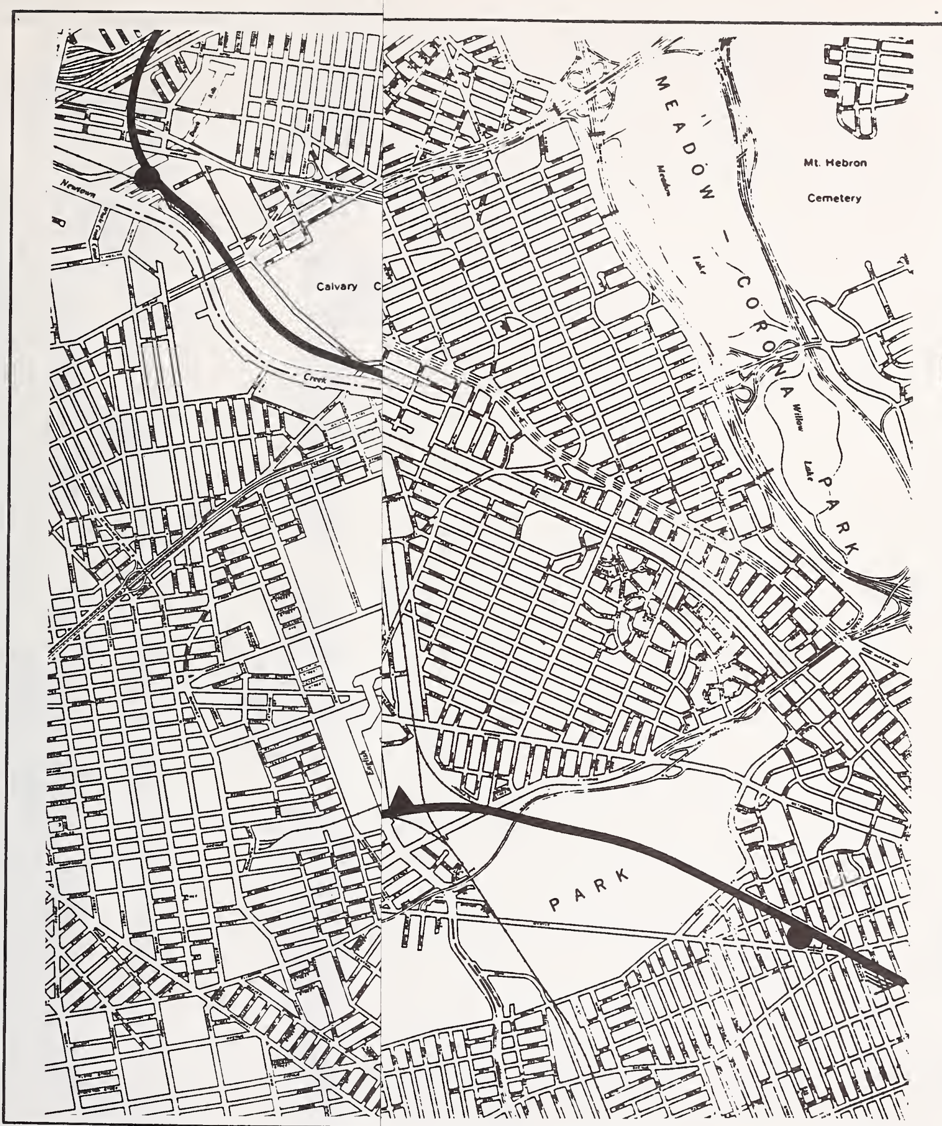
- Marlyn Warehousing - This private grade crossing will be closed. Access to the properties affected will be by an access road along the south side of the railroad from the Greenpoint Avenue crossing.

- Laurel Hill Boulevard and
- 43rd Street - These two crossings will be closed. An elevated structure over the tracks will be constructed east of Laurel Hill Boulevard below the Brooklyn-Queens Expressway. Access to properties affected will be by an access road along the south side of the railroad. (Refer to Figure A.9-12 in the Appendix).

- 49th Street - This existing grade crossing will be closed. Access to properties affected will be by way of Maspeth Avenue, less than 1/2 mile to the east.

- Maspeth Avenue - Construct an elevated structure over the tracks and 56th Road on the existing alignment of Maspeth Avenue. (Refer to Figure A.9-13 in the Appendix).

- 73rd Street - This existing grade crossing will be closed. Access to properties affected will be by an access road from 73rd Place on the north side of the railroad.



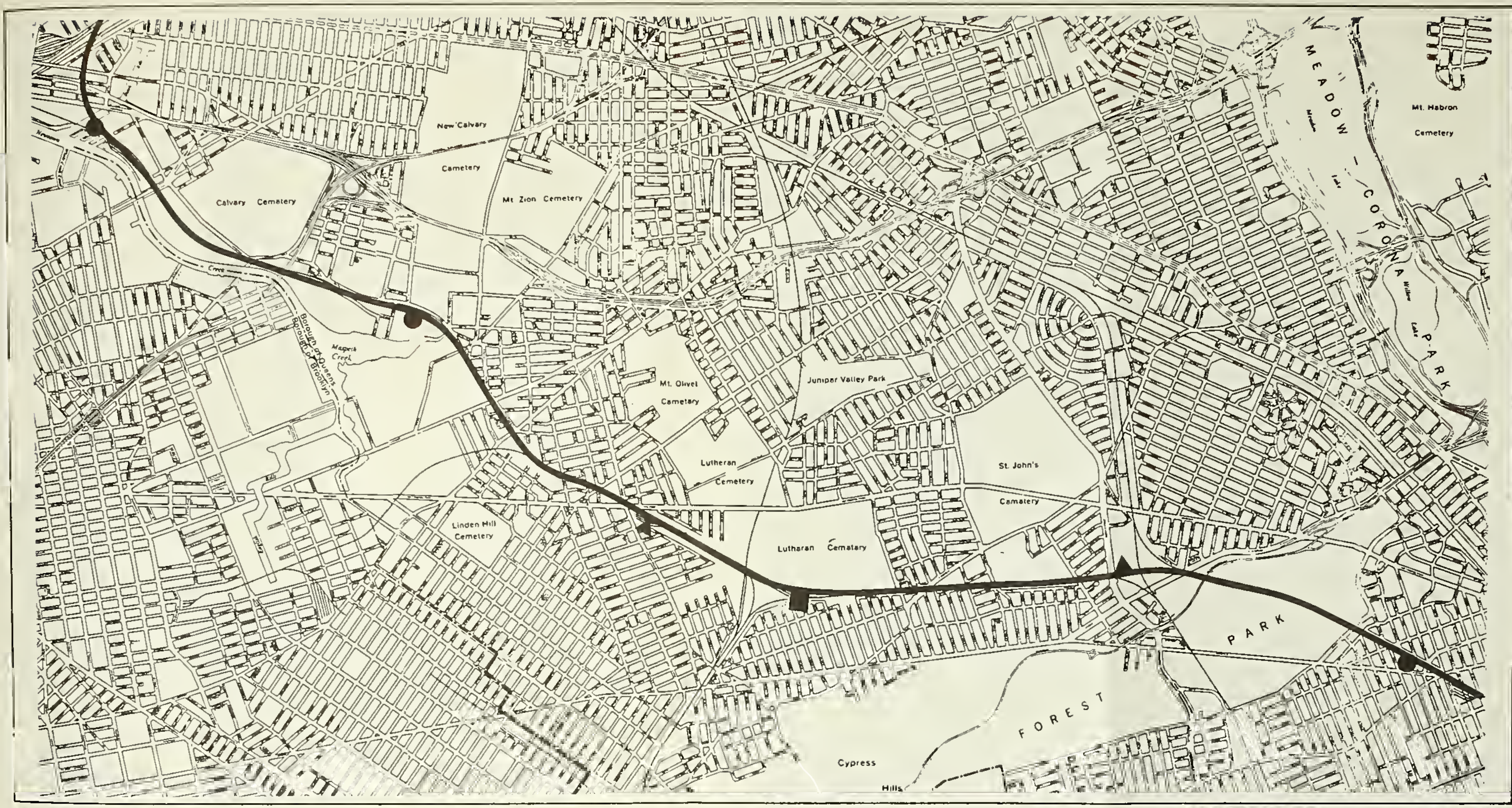
Legend
- ■ Substation for Montauk Transfer
- ▲ Substation for Montauk/Archer
- ● Substation for both Montauk Transfer and Montauk/Archer
- ▬ Montauk line

0 2000
Scale in Feet

N

LOCATIONS OF SUBSTATIONS FOR MONTAUK TRANSFER AND MONTAUK/ARCHER ALTERNATIVES

Figure 2-11



Legend
- ■ Substation for Montauk Transfer
- ▲ Substation for Montauk/Archer
- ● Substation for both Montauk Transfer and Montauk/Archer
- ▬ Montauk line

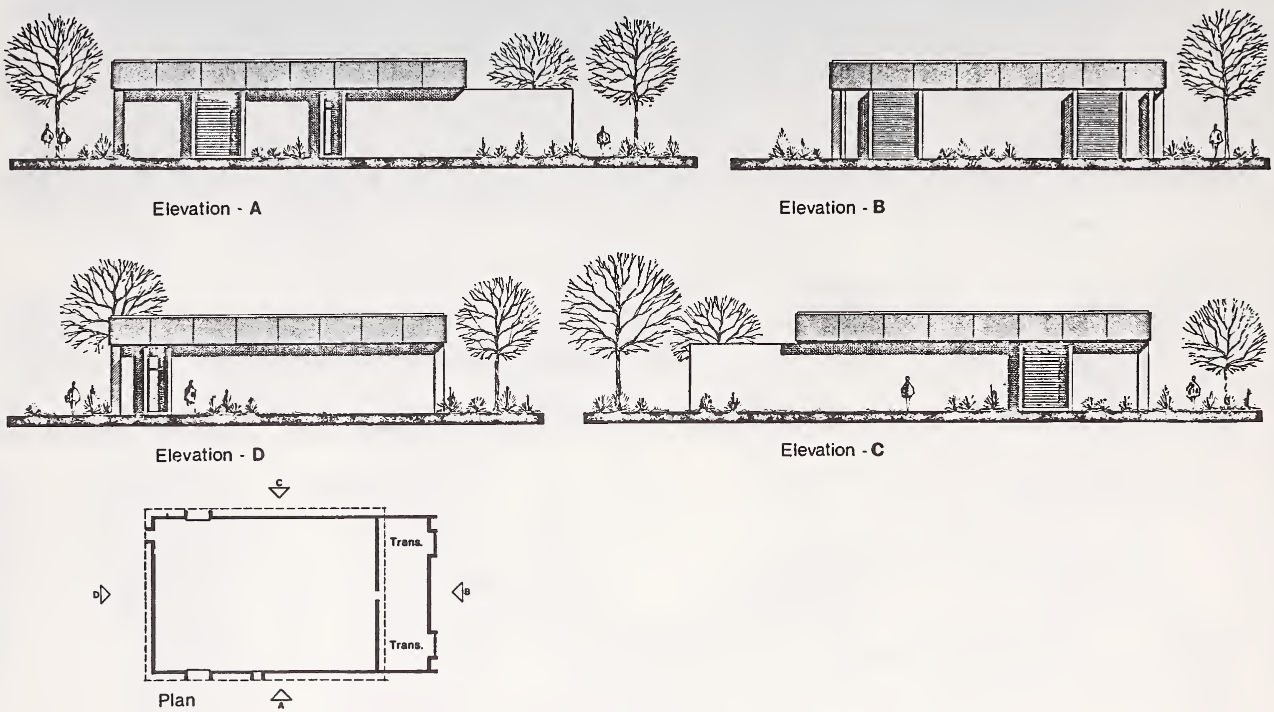
0 2000
Scale in Feet
N

Notes: Substation symbols are not to scale.
One substation for Montauk/Archer will also be located in the Sunnyside Yards.

LOCATIONS OF SUBSTATIONS FOR MONTAUK TRANSFER AND MONTAUK/ARCHER ALTERNATIVES

Figure 2-11

Queens Subway Options Study



TYPICAL MASONRY SUBSTATION BUILDING/SIDE-BY-SIDE

Figure 2-12

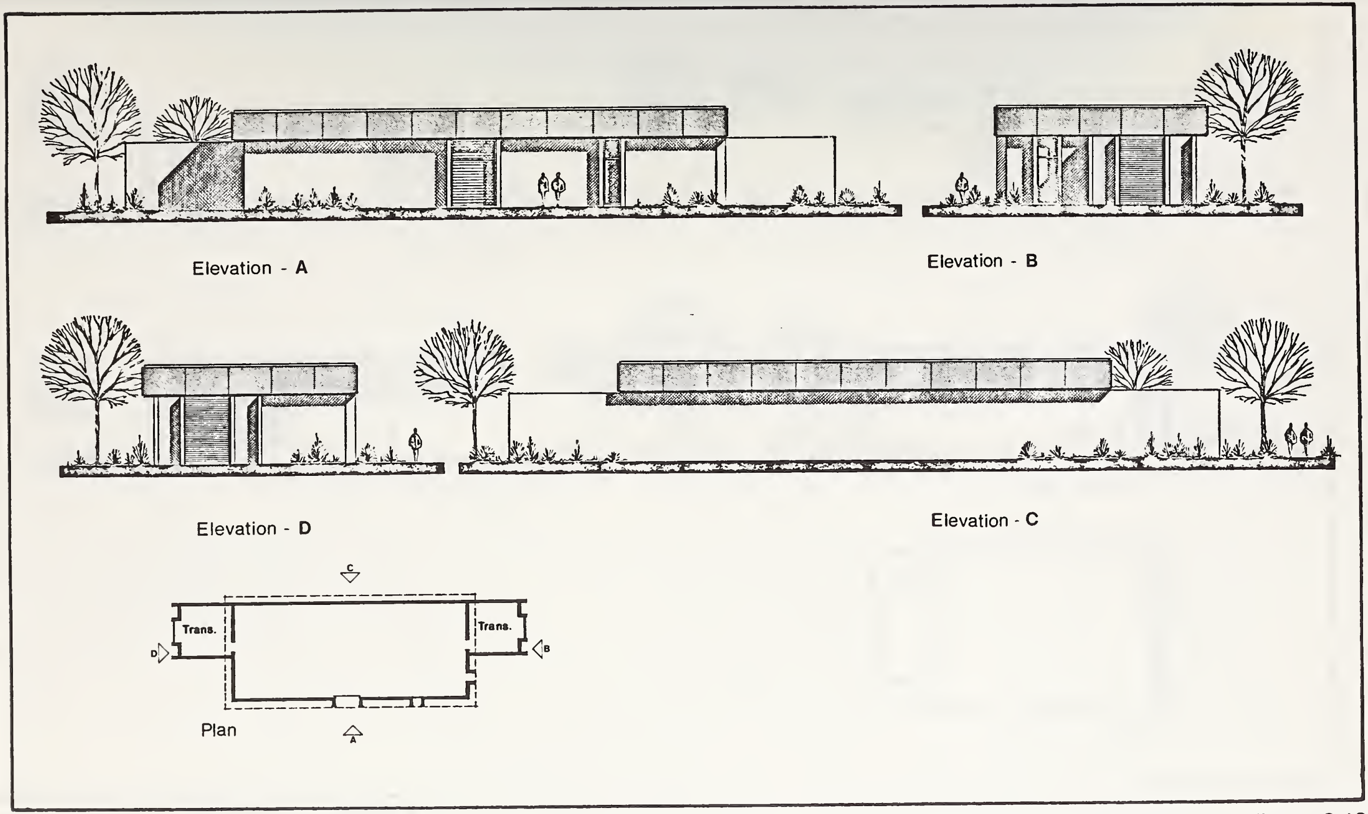
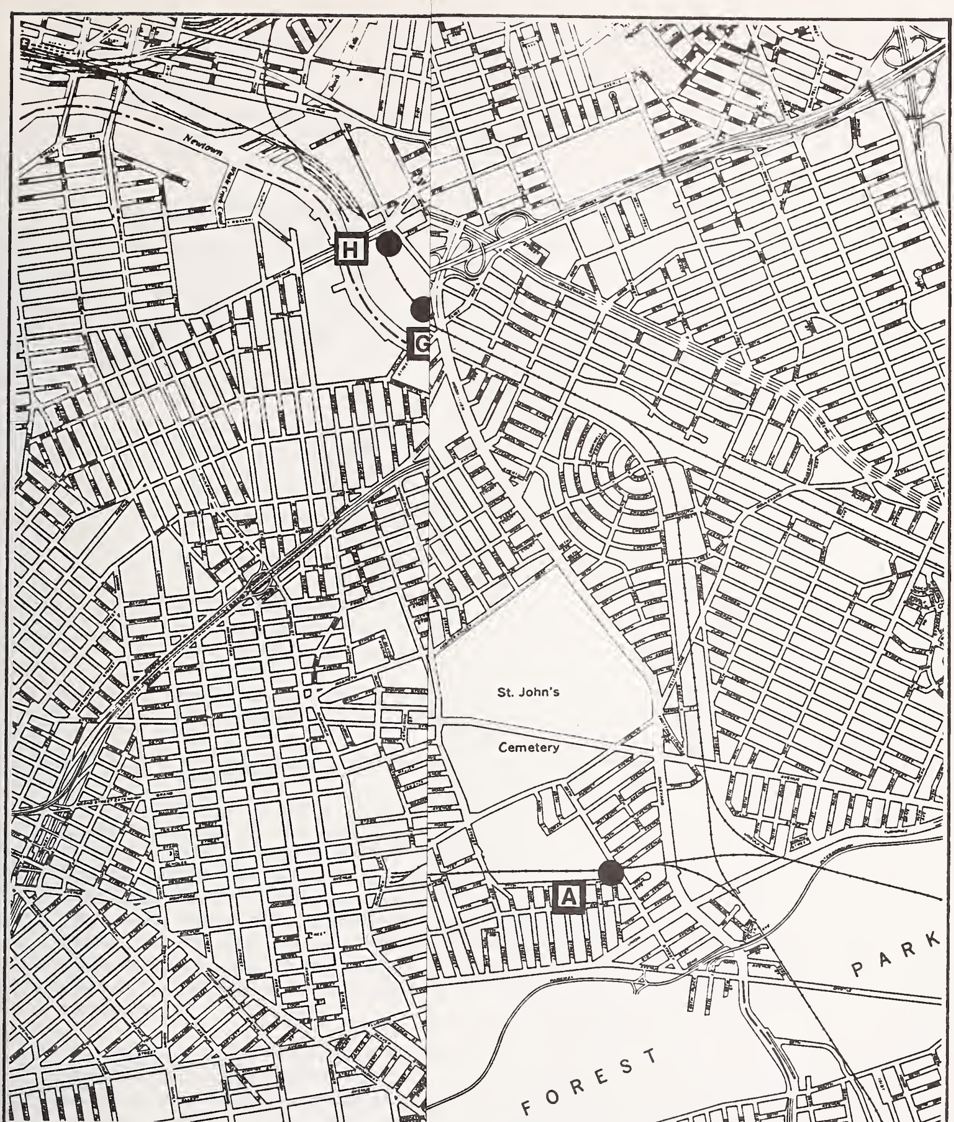


Figure 2-13

TYPICAL MASONRY SUBSTATION BUILDING/END-TO-END



Legend

- A 88th St. crossing—modified
- B 73rd St. crossing—eliminated
- C Maspeth Ave.—modified
- D 49th St. crossing—eliminated
- E 43rd Street crossing — eliminated

0 6000
Scale in Feet

N

EXISTING GRADE CROSSINGS OF MONTAUK LINE TO BE ELIMINATED OR MODIFIED

Figure 2-14

Queens Subway Options Study

Legend

A 88th St. crossing—modified
B 73rd St. crossing—eliminated
C Maspeth Ave.—modified
D 49th St. crossing—eliminated
E 43rd Street crossing — eliminated
F Laurel Hill Blvd. crossing— eliminated
G Marlyn Warehousing crossing—eliminated
H Greenpoint Ave. crossing—modified
I New crossing serving points at E and F

0 6000
Scale in Feet

N

EXISTING GRADE CROSSINGS OF MONTAUK LINE TO BE ELIMINATED OR MODIFIED

Figure 2-14

- o 88th Street - Construct an elevated structure over the tracks on the existing alignment off 88th Street. Construct a service road on the north side of the tracks to maintain access to adjacent properties.

Improvements on the LIRR Montauk Branch. The existing LIRR-Montauk Branch from Jamaica west to the Sunnyside Yard consists of two through-tracks and numerous sidings for freight cars. The nature of the rail traffic on this section of track is primarily freight; however, the LIRR does schedule three diesel powered passenger trains per day on the line, one train going into Manhattan in the morning and two going out in the evening. To run the new transit service of this alternative, eight miles of the Montauk Branch will be rehabilitated as follows:

- o The existing track and trackbed will be removed, followed by the installation of a drainage system, ballast, wood ties and continuously welded rails. To minimize vibration the rails will be mounted on resilient rubber pads attached to the ties. The drainage system will prevent the ballast from being inundated by water and thereby prevent contamination by soil particles.

- o The two through-tracks will be electrified by a third rail system.

- o A security fence will be installed for the entire length of the line. A noise barrier system will be constructed in places where the transit line is near to residences. (Refer to Figure 5-2 in Section 5.1.4.)

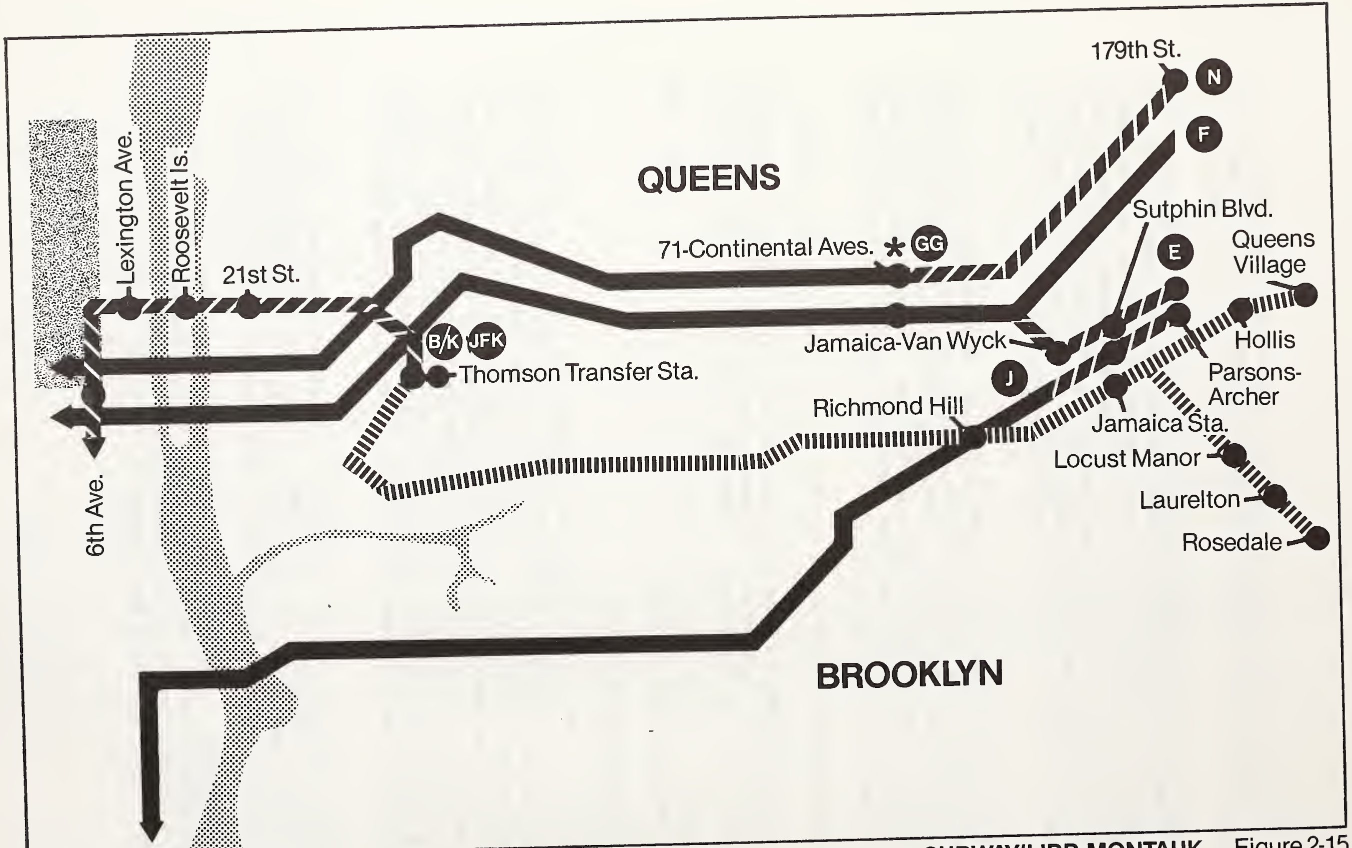
- o Existing bridge structures will be inspected in depth and rehabilitated as required.

2.2.4(b) Service Characteristics

The subway to Long Island Rail Road Transfer alternative includes the electrification of the Montauk Branch and Cutoff from Jamaica to Long Island City, as well as the construction of a rail-to-subway transfer station, near Thomson Avenue in Long Island City. Ridership for the 63rd Street subway comes from LIRR trains, from eastern (Queens Village, Hollis) and southeastern Queens (Rosedale, Laurelton, Locust Manor) as well as Jamaica and Richmond Hill. These trains use the Montauk Branch and Montauk Cutoff west of Jamaica. The transfer station would also be accessible to passengers living or working in Long Island City and a passageway would connect the station with the Queens Plaza IND Station mezzanine.

Subway Plan. Figure 2-15 is a schematic of this alternative. Table 2-8 lists the Subway/LIRR-Montauk Transfer subway routings and stopping patterns for all Queens services considered in this study. Table 2-9 describes the subway service frequencies at four weekday times -- peak, midday, evening and night.

Bus Operating Plan. Feeder bus reroutings and changes in service levels for the Montauk Transfer alternative affect several Queens communities: Jamaica, Hollis, Queens Village, Locust Manor, Laurelton, and Rosedale. A description of reroutings and changes in hourly bus volumes is contained in Table 2-10.



Note: * Same as existing service

Legend
- Existing Subway Service
- Proposed Subway Service
- Proposed LIRR Service

SUBWAY/LIRR MONTAUK TRANSFER — PROPOSED SERVICE Figure 2-15

Table 2-8

PEAK HOUR SUBWAY ROUTINGS AND STOPPING PATTERNS
SUBWAY/LIRR MONTAUK TRANSFER

		Queens				Manhattan			
Queens Terminal	Train	Queens Route	No. of Trains	Stop Pattern	Crossing	Manhattan Route	Stop Pattern	Brooklyn Route	Other Terminal
Thomson Ave.	B[1]	L.I. City	5	Local	63 Street	6 Avenue	Local	West End	Coney Island
Thomson Ave.	K[1]	L.I. City	7	Local	63 Street	6 Avenue	Local	-	2 Avenue
Parsons-Archer	E	Queens Blvd.	13	Express	53 Street	8 Avenue	Local	-	WTC
179 Street	F	Queens Blvd.	13	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	E	Queens Blvd.	2	Express	53 Street	8 Avenue	Local	-	WTC
71-Continental	F	Queens Blvd.	2	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	GG	Queens Blvd.	6	Local	-	-	-	Crosstown	Smith-9 Street
Parsons-Archer	J	Jamaica El.	12	Local	Williamsburg Bridge	Nassau-Chambers	Local	-	Broad Street
Thomson Ave.	JFK	L.I. City	3	Local	63 Street	6 Avenue	Express (on Local tracks)	Fulton	Howard Beach-JFK
179 Street	N	Queens Blvd.	14	Local	60 Street	Broadway	Local	Sea Beach	Coney Island (8) Whitehall St. (6)
Queens Village	LIRR QOS Main Line	Montauk Branch & Cutoff	5	Local	-	-	-	-	Thomson Ave.
Valley Stream (Rosedale)	LIRR QOS Atlantic	Montauk Branch & Cutoff	5	Local	-	-	-	-	Thomson Ave.

B[1] and K[1] services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

Table 2-9

OPERATING FREQUENCIES
SUBWAY/LIRR-MONTAUK TRANSFER

Service	Queens Terminal	Frequency in Trains per Hour: Peak AM/PM	Midday 12:00	Evening 9:00	Night 2:00	Remarks
B'	Thomson Avenue	5	6	5	3*	* B Shuttle from 50 Street-6 Avenue to Thomson Avenue.
K'	Thomson Avenue	7	-	-	-	New service to 2 Avenue, Manhattan.
JFK	Thomson Avenue	3	3	3	-	Present Terminal - 57 Street-6 Avenue.
N	179 Street	14*	6	-	-	Present Terminal - Continental Avenue. Off-peak trains terminate at 71-Continental. * Coney Island (8) and Whitehall Street (6).
J	Parsons-Archer	12	6	5	3	Present Terminal - Queens Boulevard
E	Parsons-Archer	15	6	5	3	Present Terminal - 179 Street Two peak-hour trains put-in at 71-Continental.
GG	71-Continental	6	6	5	3	After 10:23 p.m. terminates at Queens Plaza
F	179 Street	15	6	5	3	After 10:00 p.m. runs local from 179 Street to Queens Plaza Two peak-hour trains put-in at 71-Continental.
LIRR QOS Main Line	Thomson Avenue	5	3	2	-	Eastern terminal is Queens Village. Trains do not stop at Jamaica Station.
LIRR QOS Atlantic	Thomson Avenue	5	3	2	-	Eastern terminal is Valley Stream. (Last revenue stop is Rosedale). Trains stop at Jamaica Station.

B' and K' services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

Table 2-10

FEEDER BUS ROUTING CHANGES
SUBWAY/LIRR MONTAUK TRANSFER

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
Long Island City	Q39	9	9	0	No Change	Triboro Coach
	Q102	6	6	0	No Change	Steinway Transit
Richmond Hill	Q10	15	15	0	No Change	Green Bus Lines
	Q37	5	5	0	No Change	Green Bus Lines
	B55	12	12	0	No Change	NYCTA
	B56	6	6	0	No Change	NYCTA
Jamaica	Q3A	36[1]	36	0	No Change	NYCTA
	Q4	20	20	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q4A	14	14	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5	20	20	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5A	12	12	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5AB	12	12	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q6	6[2]	6	0	No Change	Green Bus Lines
	Q8	8	8	0	No Change	Green Bus Lines
	Q40	6	6	0	No Change	Green Bus Lines

[1] 19 Q3A buses to 153 Street and 17 to 179 Street.
[2] To Jamaica

Table 2-10 (Continued)

FEEDER BUS ROUTING CHANGES
SUBWAY/LIRR MONAUK TRANSFER

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
	Q42	6	6	0	No Change	NYCTA
	Q110	20	20	+0.3	Reroute to Parsons-Archer subway station via New York Blvd., Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q111	15	15	+0.1	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q112	8	8	+0.3	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q113	6	6	+0.1	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	N4	9	9	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	MSBA
	N5[1]	-	-	-	-	MSBA
Hollis	Q2	30	30	0	None; route passes by station on 191 Street	NYCTA
	Q3	3	5[2]	0	None; route passes by station on 191 Street	NYCTA
	Q3A	17[3]	17	0	None; route passes by station on 191 Street	NYCTA
	Q75H	0	5[2]	+3.7	New Service. Union Turnpike and Francis Lewis Blvd. to Hollis Station via Union Turnpike and 188 Street.	NYCTA
	Q110	20	20	0	No Change	Jamaica Buses
Queens Village	Q1	10	10	0	None; terminates/originates at Queens Village Station	NYCTA

[1] The N5 was to have been rerouted in the same manner as the N4. However, the N5 route was discontinued effective January, 1984.
[2] Bus service coordinated with LIRR Queens-oriented service.
[3] Includes only those Q3As which terminate at 179 Street, Jamaica

Table 2-10 (Continued)

FEEDER BUS ROUTING CHANGES
SUBWAY/LIRR MONAUK TRANSFER

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
Queens Village (Cont.)	Q3A	10[2]	10	0	None; terminates/originates at Queens Village Station	NYCTA
	Q27	6	6	0	None; terminates/originates at Queens Village Station	NYCTA
	Q27QV	0	5[1]	0	New Service. Hewlett Avenue and Union Turnpike to Queens Village Station via Union Turnpike and Springfield Boulevard	NYCTA
	Q36	12	12	0	None; passes by station on Jamaica Avenue	NYCTA
Locust Manor	Q3	3	5[1]	0	None; passes by station on Farmers Boulevard	NYCTA
	Q5A	12	12	0	None; passes by station on Farmers Boulevard	NYCTA
	Q5AB	12	12	0	None; terminates at Locust Manor Station	NYCTA
	Q77LM	0	5[1]	0	New Service. 119 Avenue and 238 Street to Locust Manor Station via 119 Avenue and Springfield Boulevard	NYCTA
Laurelton	Q5ALS	4	5[1]	0	No Change	NYCTA
	Q77	6	6	0	No Change	NYCTA
Rosedale	Q5	20	20	0	No Change	NYCTA
	Q5A	12	12	0	None, passes by station on N. Conduit Ave. and S. Conduit Ave.	NYCTA
	Q5S	3	5[1]	+0.8	Extend northern terminal to 130 Ave. via Brookville Blvd.	NYCTA

[1] Bus service coordinated with LIRR Queens-oriented service.
[2] Includes only those Q3As originating near the Queens Village Station

Current bus service to the Richmond Hill Station is adequate. The changes to the Jamaica feeder bus network are identical to those of the three previous alternatives. Ten bus lines are changed to feed the Parsons-Archer Subway Station rather than stations on the Queens Boulevard line.

Commuters in eastern Queens will have a choice between feeder bus service to Jamaica and to the expanded Long Island Rail Road service at Hollis and Queens Village. Feeder bus service will be expanded at these two stations as well as Locust Manor, Laurelton and Rosedale and coordinated with the new Queens-oriented trains. Buses will meet each of the five peak hour trains at each station.

LIRR Operating Plan. In the Long Island Rail Road component of the alternative, five peak-hour Queens-oriented trains originate at both Queens Village and Rosedale and travel to the Thomson Avenue Transfer Station. Five trains return east to Queens Village and four trains return east to Rosedale for second trips. The Queens Village trains make intermediate stops at Hollis and Richmond Hill. The Rosedale trains make intermediate stops at Laurelton, Locust Manor, Jamaica and Richmond Hill. Midday frequencies on each branch are three trains per hour and evening frequencies are two trains. Peak hour trains consist of eight cars. Off-peak trains consist of four cars, reducing energy consumption, car wear and noise. A crew will be stationed at Yard A to couple and uncouple the trainsets before and after each weekday peak period.

A detailed analysis of proposed Queens-oriented trains and future LIRR service, allowing for projected growth was performed using a network simulation computer program. The analysis shows that, with certain improvements to the LIRR near Jamaica Station and some changes in the operating pattern of the LIRR, the new services can coexist without creating delays to either operation. This analysis is discussed in greater detail in Working Paper 6: LIRR Capacity Analysis and Working Paper 7: Refined System Sizing, respectively.

Headways between successive midday and evening trains are long enough to permit LIRR-Montauk Branch freight trains to move in the Queens-oriented service train flow. The six minute headways between peak-hour passenger trains on the Montauk Branch are inadequate for freight trains to operate without delaying passenger trains. To allow uninterrupted freight-siding service on the Montauk Branch, no LIRR passenger trains operate to the transfer station between approximately 11:00 PM and 5:00 AM.

The run time between Queens Village and Jamaica Station is nine minutes. Between Rosedale and Jamaica the run time is eleven minutes. Between Jamaica and Thomson Avenue the run time is 18 minutes. To facilitate the proposed operating plans, it is necessary to eliminate the stops of two eastbound LIRR-Hempstead trains at Hollis and Queens Village. A check of the ridership at these stations on three successive days showed that less than ten passengers boarded each of these trains. Replacement service is available by taking a westbound LIRR train to Jamaica and boarding the eastbound train there or by using existing bus service on Hillside Avenue (as far as Hicksville), Hempstead Turnpike (to Hempstead), and Jericho Turnpike (to Roosevelt Field).

For the LIRR component of this alternative, major capital costs for the Montauk Transfer include electrification and upgrading of the Montauk Branch from Jamaica to the Montauk Transfer for 60 mph operation and the construction and rehabilitation of stations. A number of other improvements to the Jamaica Station interlockings will raise its capacity to permit future LIRR growth as well as the proposed Queens-oriented service. These other items are part of the LIRR's Jamaica Station Improvements Program and are not included in the capital cost estimate for the Montauk Transfer. These improvements which will be made regardless of the study, will increase the ability of the LIRR to move trains through Jamaica Station efficiently, resulting in the movement of 15 more trains in the peak hour in the peak direction, a 40 percent increase over existing conditions.

2.2.5 Montauk/Archer Avenue Subway Connection

2.2.5(a) Physical Characteristics

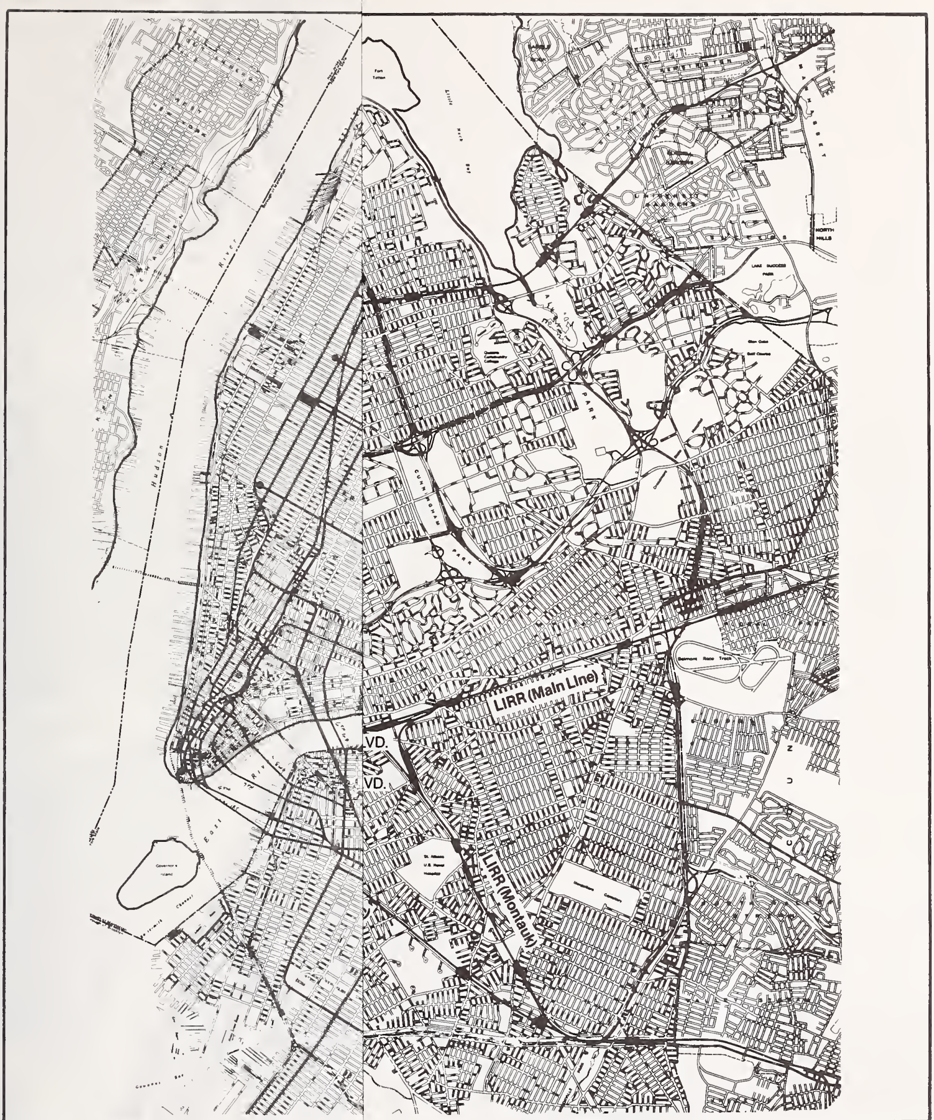
Under this alternative, the Transit Authority would operate trains from the 63rd Street Tunnel to the lower level of the Archer Avenue subway by way of the LIRR Montauk Branch (see Figure 2-16). The length of the new subway line proposed under this alternative would be approximately eight miles.

Assuming that the preferred alternative is selected and agreed to by January 1985, preliminary engineering for this alternative would be complete by March 1987. Agency review would be finalized by January 1988, and final design would be complete by January 1991. The earliest date for the completion of construction and start of operations would be January 1997.

Alignment. The alignment for this alternative is the same as the alignment detailed in Section 2.2.4, Subway/LIRR-Montauk Transfer between the end of the 63rd Street Tunnel and the exising LIRR station at Richmond Hill on the Montauk Branch. New stations, at Fresh Pond Road and Woodhaven Boulevard, would be constructed under this alternative.

From the east end of Richmond Hill Station, the transit line curves to the east at Lefferts Boulevard, rising in elevation to join the existing Jamaica Avenue Elevated Line near 122nd Street (see Figure 2-17). After joining the Elevated, the transit line meets the new construction of the Archer Avenue subway at 127th Street as detailed in Section 2.2.1, No Additional Construction.

In order to make the connection to the Jamaica Avenue Elevated line and because the J train cannot be operated on the Archer Avenue line along with the new Montauk service, a portion of the existing structure carrying the J service will have to be removed. The transit operating plan for this alternative has all trains using the lower level of the Archer Avenue subway routed onto the Montauk Branch; therefore, a track connection to the Jamaica Elevated line west of Lefferts Boulevard will not be maintained. The existing Elevated would be removed from Lefferts Boulevard to a point east of the Crescent Street Station, which would become the new eastern terminal for the 'J' service. In all, seven stations would be eliminated on the Jamaica Avenue Elevated: 121st, 111th and 102nd Streets, Woodhaven Boulevard, Forest Parkway, Elderts Lane and Cypress Hills. (Refer to Figures A.9-15 and A.9-16 in the Appendix).



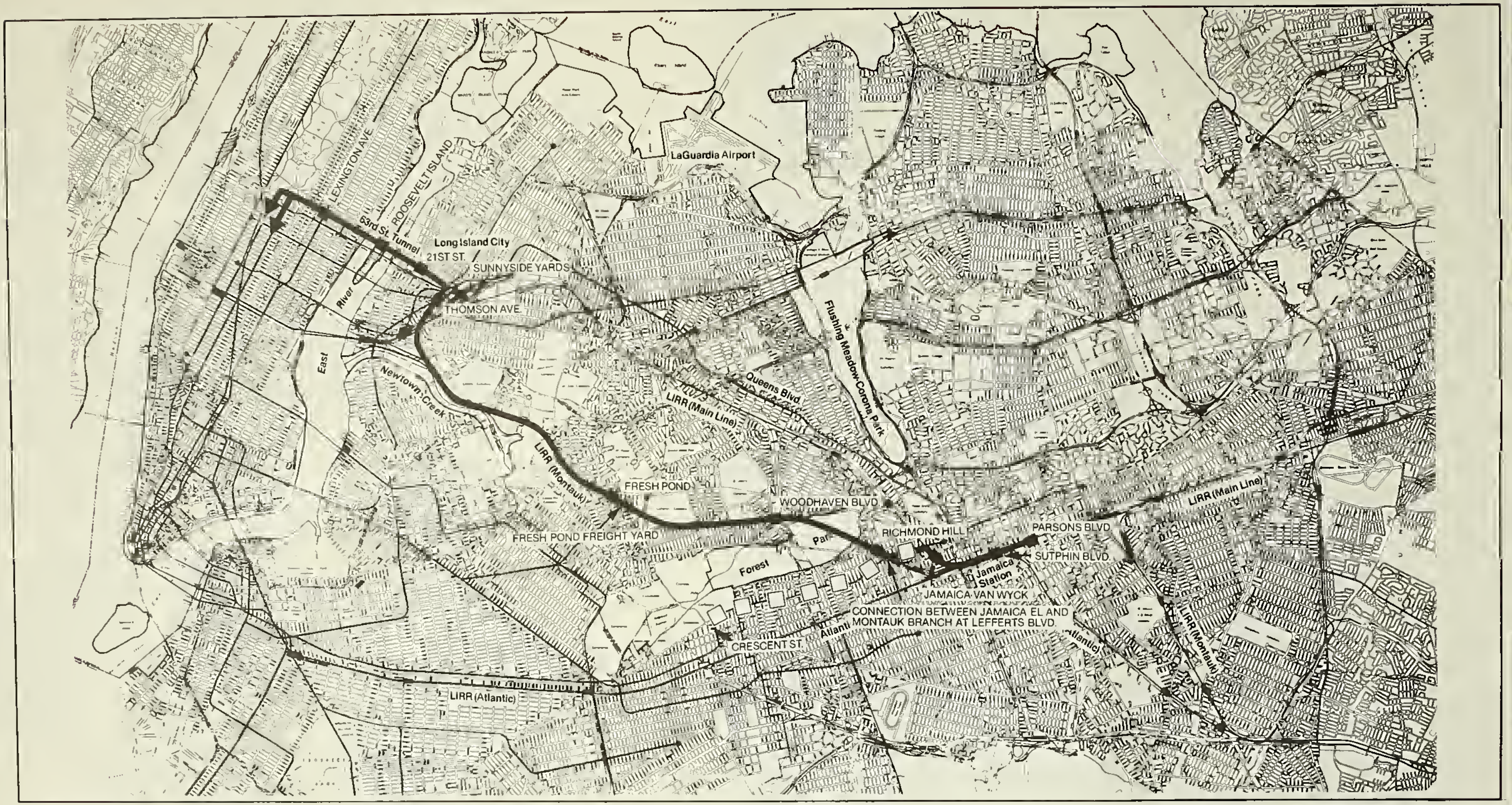
Legend

- New Route
- Station
- Stations on J Line to be eliminated

0 6000
Scale in Feet

N

MONTAUK/ARCHER AVE. SUBWAY CONNECTION Figure 2-16

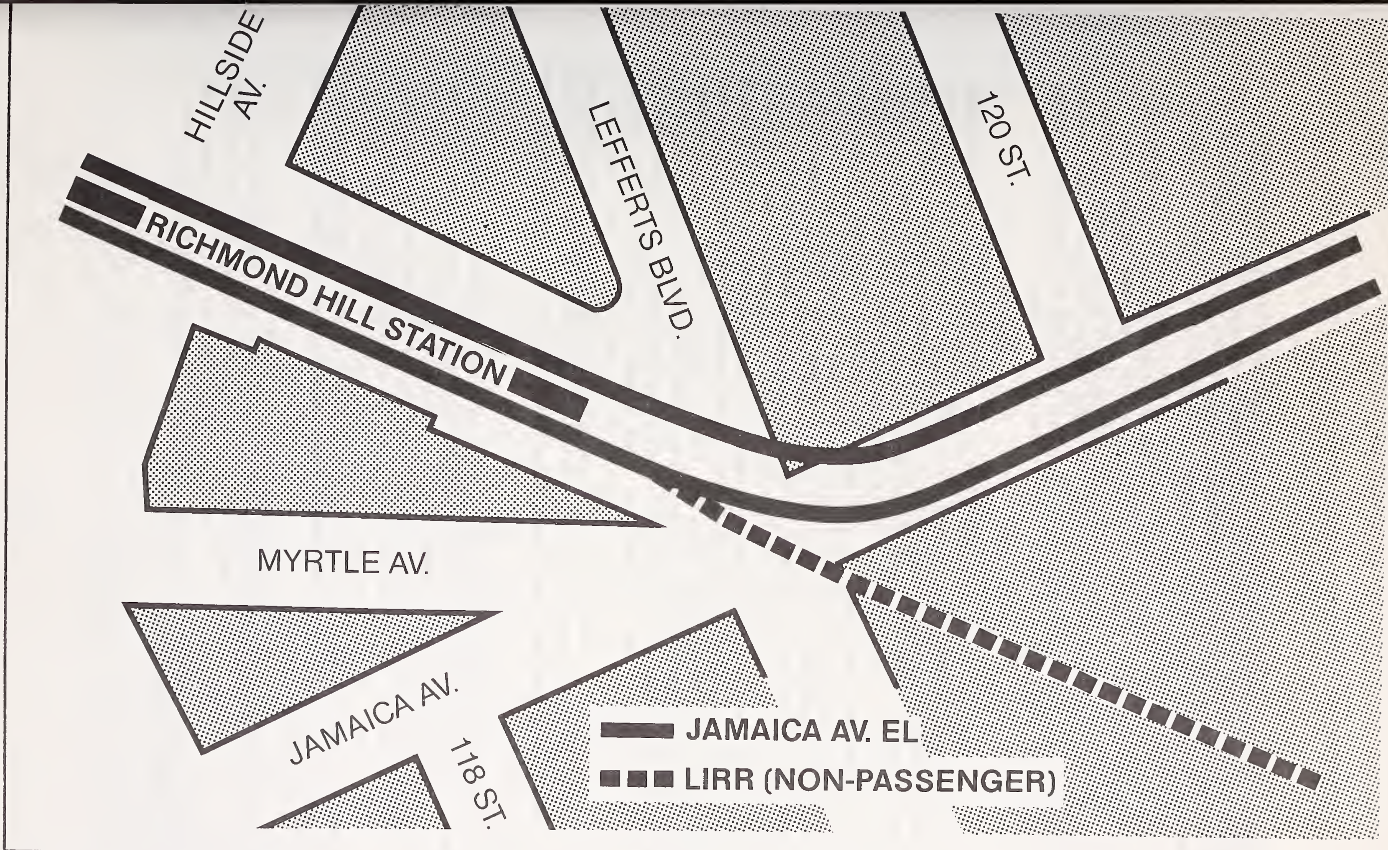


Legend

New Route
Station
Stations on J Line to be eliminated

0 6000
Scale in Feet
N

MONTAUK/ARCHER AVE. SUBWAY CONNECTION Figure 2-16



MONTAUK/ARCHER AVENUE SUBWAY CONNECTION — RICHMOND HILL AREA

Figure 2-17

Stations. A station would be built in the Sunnyside Yard in the vicinity of Thomson Avenue. This station would be constructed in an open cut similar to the Transit Authority level of the Thomson Transfer Station detailed in Section 2.2.4 with the exception that under this alternative the station is not a terminal.

The Fresh Pond Station will be built at the intersection of Fresh Pond Road and Metropolitan Avenue where the Montauk Branch tracks are below street level in an open cut. The station will consist of a fare control and bus transfer area at street level with stairs, escalators and an elevator descending to a two track, center island platform. The platform will be furnished with a full-length canopy and windscreens for passenger protection. (Refer to Figure A.9-17 in the Appendix).

The new station at Woodhaven would be built at the point where the Woodhaven Boulevard grade separated crossing passes over the Montauk Branch tracks. The two track, center island platform will be located on the east side of Woodhaven Boulevard in an area bounded by an industrial area on the north and a Little League baseball field on the south. Primary passenger access to the station will be provided by widening the existing Woodhaven Boulevard structure 25 feet on both the northbound and southbound sides so that bus drop-off lanes and wider sidewalks can be constructed. A fare control area would be constructed at the platform level and at the level of the bus drop-off lane on the northbound (east) side of Woodhaven Boulevard. Access to the fare control area would be direct for northbound bus passengers and by an underpass below the Woodhaven Boulevard overpass for southbound bus passengers. Secondary access would be provided by reconstructing the stairways from the at grade service roads of Woodhaven Boulevard to the elevated fare control area. Passenger cars would not be encouraged to use the drop-off area on the widened structure. Passengers being dropped off by cars would use the service road area on the north side of the station which is primarily industrial. The service road area on the south side of the station is primarily residential and use of the area would be discouraged by posting of appropriate signs. Elevators would be provided for the elderly and handicapped access to the fare control area and the platform. (Refer to Figure A.9-18 in the Appendix).

The existing LIRR Station at Richmond Hill will be modified for use in this alternative. The existing platform will be lengthened to accomodate 600 feet long Transit Authority trains. Fare control areas will be created below the station platform with direct street access from Hillside Avenue and Lefferts Boulevard. The existing platform surface will be removed and replaced with a precast concrete deck. Escalators and stairs will provide access from the fare control areas to the platform and an elevator will be provided on the west side of Hillside Avenue for access by the handicapped and elderly. (Refer to Figure A.9-19 in the Appendix).

Storage and Maintenance Facilities. The existing LIRR Sunnyside Yard 'A' will be the site of the storage yard for approximately 300 TA subway cars for this alternative. Yard 'A' is now the location of LIRR freight car classification; this operation will be moved to an existing freight yard east of the proposed Fresh Pond Station.

Substations. The Montauk/Archer alternative will require the installation of six substations (see Figure 2-11). These facilities will be constructed in existing railroad right-of-way and will not require property acquisition. Figures 2-12 and 2-13 show typical designs for the proposed substations. Depending on the configuration of the available space, either a side-by-side or an end-to-end design will be used.

Grade Separated Crossings. Under this alternative, the existing grade crossings on the Montauk Branch will be closed. Access to the properties affected will be as detailed in Section 2.2.4, Subway/LIRR-Montauk Transfer.

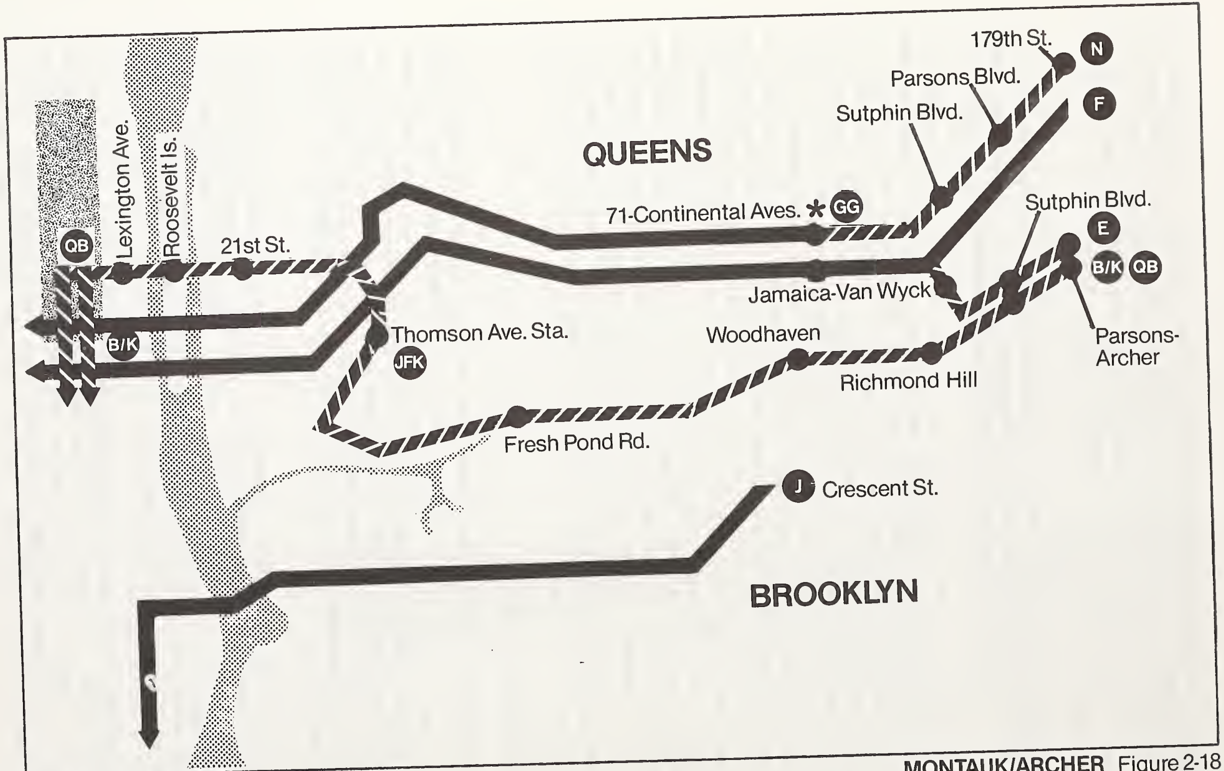
Additional Features. The freight operating plan for this alternative has all LIRR freight classification operations moved from the present Sunnyside Yard 'A' location to an existing yard at Fresh Pond Junction. This shift of operations will move the classification operation closer to the Conrail connection on the Bay Ridge Line where freight cars enter the Montauk Branch. To avoid a potential conflict between LIRR freight trains and TA passenger trains, when freight cars must be moved west on the Montauk Branch from Fresh Pond to customers, a third track will be constructed adjacent to and on the south side of the two existing through-tracks between Fresh Pond and Bliss Interlocking in Long Island City. This third track will be for the exclusive use by freight trains and would not be electrified. The existing right-of-way of the Montauk Branch is generally at least 50 feet wide and can accomodate a third track. The two existing through tracks, however, do not maintain a constant location in relation to the right-of-way (R.O.W.) lines and tend to meander north and south within the R.O.W. The two existing tracks will be realigned which will be done in conjuction with the general rehabilitation of the Montauk Branch described in Section 2.2.4. Existing structures over Flushing Avenue and Grand Avenue will be widened to carry the third track.

2.2.5(b) Service Characteristics

In this alternative, the Montauk Branch of the Long Island Rail Road serves as the connector between the Archer Avenue subway in Richmond Hill and the 63rd Street subway in Long Island City. Subway trains operate on the Montauk Branch and the Montauk Cutoff, making stops at Richmond Hill, Woodhaven Boulevard and Fresh Pond Road. A new Transit Authority yard and inspection barn is constructed at Yard A in Long Island City to store Montauk/Archer subway trains. A third freight-only track is constructed from Fresh Pond to Long Island City to permit daytime freight operations.

Subway Plan. Figure 2-18 is a schematic of the alternative. Table 2-11 lists the Montauk/Archer Avenue Subway Connection routings and stopping patterns for all Queens services considered in this study. Table 2-12 describes the subway service frequencies at four weekday times -- peak, midday; evening and night. No subway service will operate on the Montauk Line between 11:00 PM and 5:30 AM to allow for LIRR freight operations.

Bus Operating Plan. Stations with altered feeder bus routing patterns under the Montauk/Archer Subway Connection include Woodhaven Boulevard, Fresh Pond Road, and Jamaica. Feeder bus service changes for ten bus routes terminating at Jamaica are identical to those outlined in the previous four alternatives. Table 2-13 summarizes the proposed feeder bus service to all Montauk/Archer Stations.



Note: * Same as existing service

Legend
Existing Subway Service
Proposed Subway Service

MONTAUK/ARCHER AVENUE SUBWAY CONNECTION — PROPOSED SERVICE Figure 2-18

Table 2-11

PEAK HOUR SUBWAY ROUTINGS AND STOPPING PATTERNS
MONTAUK/ARCHER AVE. SUBWAY CONNECTION

		Queens				Manhattan			
Queens Terminal	Train	Queens Route	No. of Trains	Stop Pattern	Crossing	Manhattan Route	Stop Pattern	Brooklyn Route	Other Terminal
Parsons-Archer	E	Queens Blvd.	13	Express	53 Street	8 Avenue	Local	-	WTC
179 Street	F	Queens Blvd.	13	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71/Continental	E	Queens Blvd.	2	Express	53 Street	8 Avenue	Local	-	WTC
71/Continental	F	Queens Blvd.	2	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71/Continental	GG	Queens Blvd.	6	Local	-	-	-	Crosstown	Smith-9 Street
Crescent St.	J	Jamaica El.	12	Local	Williamsburg Bridge	Nassau-Chambers	Local	-	Broad Street
Thomson Ave.	JFK	L.I. City	3	Local	63 Street	6 Avenue	Express (on Local tracks)	Fulton	Howard Beach-JFK
179 Street	N	Queens Blvd.	14	Local	60 Street	Broadway	Local	Sea Beach	Coney Island (8) Whitehall St. (6)
Parsons-Archer	B[1]	Montauk Branch & Cutoff	5	Local	63 Street	6 Avenue	Local	West End	Coney Island
Parsons-Archer	K[1]	Montauk Branch & Cutoff	7	Local	63 Street	6 Avenue	Local	-	2 Avenue
Parsons-Archer	QB	Montauk Branch & Cutoff	6	Local	63 Street	Broadway	Express	Brighton	Coney Island

B[1] and K[1] services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

Table 2-12

OPERATING FREQUENCIES
MONTAUK/ARCHER AVENUE SUBWAY CONNECTION

Service	Queens Terminal	Frequency in Trains per Hour: Peak AM/PM	Midday 12:00	Evening 9:00	Night 2:00	Remarks
B¹	Parsons-Archer	5	6	5	3*	* B Shuttle from 50 Street-6 Avenue to Thomson Avenue. No night service east of Thomson Avenue to permit LIRR Montauk Branch freight service.
K¹	Parsons-Archer	7	-	-	-	New service to 2 Avenue, Manhattan.
JFK	Thomson Avenue	3	3	3	-	Present Terminal - 57 Street-6 Avenue
N	179 Street	14*	6	-	-	Present Terminal - 71-Continental Avenue. Off-peak trains terminate at 71-Continental. Last train departs 71-Continental at 7:17 p.m. * Coney Island (8) and Whitehall Street (6).
E	Parsons-Archer	15	6	5	3	Present Terminal - 179 Street. Two peak-hour trains put-in at 71-Continental.
F	179 Street	15	6	5	3	After 7:17 p.m. runs local 179 Street to 71-Continental. After 10:00 p.m. runs local from 179 Street to Queens Plaza. Two peak-hour trains put in at 71-Continental.
J	Crescent Street	12	6	5	3	Present Terminal - Queens Boulevard
GG	71-Continental	6	6	5	3	After 10:23 p.m. terminates at Queens Plaza.
QB	Parsons-Archer	6	-	-	-	Peak hour only. All southbound morning trains terminate at Coney Island via the Brighton Line. Northbound morning service includes 8 trains (all on 10 minute headways) departing Coney Island, 6 to Parsons-Archer and 2 convert to RR service at 57 Street-7 Avenue. Evening peak service is reverse of morning peak service.

B¹ and K¹ services operate on the same route in Queens; the B operates through to Brooklyn while the K terminates in Manhattan.

Table 2-13

FEEDER BUS ROUTING CHANGES
MONTAUK/ARCHER AVENUE SUBWAY CONNECTION

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
Long Island City	Q39	9	9	0	No Change	Triboro Coach
	Q102	6	6	0	No Change	Steinway Transit
Richmond Hill	Q10	15	15	0	No Change	Green Bus Lines
	Q37	5	5	0	No Change	Green Bus Lines
	B55	12	12	0	No Change	NYCTA
	B56	6	6	0	No Change	NYCTA
Jamaica	Q3A	36[1]	36	0	No Change	NYCTA
	Q4	20	20	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q4A	14	14	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5	20	20	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5A	12	12	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q5AB	12	12	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	NYCTA
	Q6	6[2]	6	0	No Change	Green Bus Lines
	Q8	8	8	0	No Change	Green Bus Lines

[1] 19 Q3A buses to 153 Street and 17 to 179 Street
[2] To Jamaica

Table 2-13 (Continued)

FEEDER BUS ROUTING CHANGES
MONTAUK/ARCHER AVENUE SUBWAY CONNECTION

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
	Q40	6	6	0	No Change	Green Bus Lines
	Q42	6	6	0	No Change	NYCTA
	Q110	20	20	+0.3	Reroute to Parsons-Archer subway station via New York Blvd., Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q111	15	15	+0.1	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q112	8	8	+0.3	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	Q113	6	6	+0.1	Reroute to Parsons-Archer subway station via Archer Avenue and Parsons Blvd.	Jamaica Buses
	N4	9	9	0	Reroute to Parsons-Archer subway station via Jamaica Avenue, Parsons Blvd. and Archer Avenue	MSBA
	N5[1]	-	-	-	-	MSBA
Fresh Pond Road	Q38	10	10	0	Passes by station at Fresh Pond Road and Metropolitan Ave.	Triboro Coach Corp.
	Q39	9	9	+0.2	Reroute to station via Metropolitan Ave. and Fresh Pond Road	Triboro Coach Corp.
	Q67	10	10	0	No Change. Terminates at site of station.	Queens Transit Corp.
	B53	15	15	0	Passes by station along Metropolitan Ave.	NYCTA
	B58	10	10	+0.9	Replace segment from Fresh Pond Road to Wyckoff Ave Subway Station with segment to Myrtle Avenue and 80 Street.	NYCTA
Woodhaven Blvd.	Q11	8	12	0	None, passes by proposed station along Woodhaven Blvd.	Green Bus Lines

[1] The N5 was to have been rerouted in the same manner as the N4. However, the N5 route was discontinued effective January, 1984.

Table 2-13 (Continued)

FEEDER BUS ROUTING CHANGES
MONTAUK/ARCHER AVENUE SUBWAY CONNECTION

Station	Bus	Existing Peak BPH	Proposed Peak BPH	Change in One-Way Distance (Miles)	Description of Routing Change	Operator
Woodhaven Blvd. (Cont.)	Q23	18	18	+0.9	Extend southern terminal to proposed station via Union Tpke. Terminates at Woodhaven Blvd. access road, north of tracks.	Triboro Coach Corp.
	Q53	2	2	0	None, passes by proposed station along Woodhaven Blvd.	Triboro Coach Corp.

The N5 was to have been rerouted in the same manner as the N4. However, the N5 route was discontinued effective January, 1984.

Four bus routes currently serve the Fresh Pond Road Station. One of the routes is altered to better serve the residential area immediately north of the Cypress Hills Cemetery. In addition, another bus is rerouted to serve the Fresh Pond Road Station.

Two bus routes currently serve the proposed Woodhaven Boulevard Station site. Because of projected strong ridership demand, peak-hour frequency for one of them will be increased. In addition, the southern terminal of a nearby bus route will be extended to serve the Woodhaven Boulevard Station. As noted previously, this alternative calls for removal of the Jamaica Avenue Elevated from Crescent Street to the proposed connection at Richmond Hill. Replacement bus service will be provided.

LIRR Operating Plan. In the Montauk/Archer alternative, the LIRR would continue moving freight on the Montauk Branch. Freight trains would use the third freight-only track when subway service is operating and all tracks between 11:00 PM and 5:30 AM. The LIRR's other operations on the branch -- diesel passenger trains and locomotive equipment moves -- would be discontinued or rerouted to Long Island City via the Main Line. The Railroad would continue to maintain and operate the right-of-way.

2.3 Capital Costs

This section presents information on the methods used to calculate estimated capital costs and the estimated capital costs for each of the five alternatives.

2.3.1 Cost Estimation Methods, General Approach

The computation of capital costs for the construction of the planned new facilties involves the development of unit prices for items of work and the estimation of quantities for these items. Four of the alternatives studied require construction of new facilities, ranging in magnitude from the least extensive in the Queens Boulevard Line Local Connection to the most extensive in the Queens Bypass Express.

The development of unit prices started with the collection of data from recent bids for construction on the 63rd Street and Archer Avenue subway lines. Unit prices for the items of work in these bids were selected for use on the basis of similarity to the items of work anticipated for the new facilities. To allow for the effect of inflation on the unit prices, the historical rise of the Engineering News Record Construction Cost Index (CCI) from 1962 to 1982 was analyzed and plotted in graph form (see Figure A.9-20 in the Appendix). The upward trend of the data is approximated by a straight line to 1983.

The estimation of quantities was done using schematic design drawings which can be found in the Appendix. Quantities were estimated on a disaggregate level; items of work, such as excavation, concrete, structural steel, track, etc. each had a corresponding quantity for each alternative. The level of detail in the quantity estimates was the same for each alternative so that the final dollar amounts can serve as a valid comparison between the alternatives.

2.3.2 Capital Costs

The capital costs in 1983 dollars for each alternative are shown on Tables 2-14 through 2-17. These tables are a summary of the detailed capital cost estimates to be found in the Technical Supplement.

The tables list the various segments of each alternative and the corresponding costs broken down as follows:

a) Line and Stations Cost - the cost obtained by multiplying the estimated quantities by the unit prices.

b) Contractor's Mobilization - this cost, equal to 3% of the capital cost, is for general conditions such as insurances, supervisor's salaries and other indirect costs.

c) Administration, Engineering, and Construction Contingency -this cost, equal to 20% of the capital cost, is for the final design of the facilities, for any changes that may be necessary during final design and construction and for administrative costs for agencies overseeing the project.

d) Estimated Property Cost - this cost is for property acquisition for the new facilities.

e) Construction Supervision and Force Account - this cost, equal to 8% of the capital cost, is for LIRR and/or TA personnel that will be involved with design review or supervision of construction of the new facilities.

f) Rolling Stock - The estimated cost for new cars was based on the costs contained in the 1983 Transit Authority contract for IND, BMT (Division B) cars (R-68 model).

2.4 Operating and Maintenance Costs

This section presents information on the methodology employed to estimate operating and maintenance (O&M) costs for each of the five alternatives. In the discussion of the O&M costs for each alternative, the costs are broken into component parts such as subway and bus operations.

2.4.1 Cost Estimation Techniques

2.4.1(a) General Approach

Three operating cost models have been developed for the Queens Subway Options Study, as covered in the Working Paper #8: Transit Operating Cost Models materials contained in the Technical Supplement. The rapid transit model and the commuter railroad model are essentially cost build-up models while the surface transit model is a "three factor model" defined below. The models are designed to estimate operating costs, given typical New York City operating characteristics for alternative transit systems.

TABLE 2-14: QUEENS BYPASS EXPRESS ALTERNATIVE (1983)
CAPITAL COSTS
ALL PRICES IN 000's
OF 1983 DOLLARS

Segment	Capital Cost	Contractor Mobilization (Cap.Cost x 3%)	Administration(4%) Engineering(6%) Const.Contingency(10%) (Cap.Cost x 20%)	Estimated Property Costs	Construction Supervision(5%) & Force Account(3%) (Cap.Cost x 8%)	Total
End of 63rd Street Tunnel to West End of Northern Blvd. Station	$ 21,400	$ 650	$ 4,300	$ 2,000	$ 1,750	$ 30,100
Northern Blvd. Station	35,800	1,100	7,200	0	2,900	47,000
East End of Northern Blvd. Station to Portal	131,800	4,000	26,400	0	10,500	172,700
Sunnyside Portal to West End of Woodside Station	39,300	1,200	7,900	2,300	3,100	53,800
Woodside Station	6,400	200	1,300	2,000	500	10,400
East End of Woodside Station to Forest Hills Portal	65,900	2,000	13,200	700*	5,300	87,100
Forest Hills Portal to 71st St./Continental Ave.	100,000	3,000	20,000	0	8,000	131,000
71st St./Continental Ave. Station	24,100	750	4,800	100	1,950	31,700
71st St./Continental Ave. Station to 73rd Ave.	39,600	1,200	7,900	0	3,200	51,900
SUBTOTALS	$464,300	$ 14,100	$ 93,000	$ 7,100	$ 37,200	$ 615,700
YARD + MAINTENANCE FACILITY	32,900	1,000	6,600	-	2,600	43,100
ROLLING STOCK	272,200	-	-	-	-	272,200
TOTALS	$769,400	$ 15,100	$ 99,600	$ 7,100	$ 39,800	$ 931,000

* Since completion of the cost estimates, construction started on a building at 62-07 Woodside Avenue which may increase the property costs shown here by $750,000 to $1,000,000.

TABLE 2-15: QUEENS BOULEVARD LINE, LOCAL CONNECTION ALTERNATIVE
CAPITAL COSTS
ALL PRICES IN 000's
OF 1983 DOLLARS

Segment	Capital Cost	Contractor Mobilization (Cap.Cost x 3%)	Administration(4%) Engineering(6%) Const.Contingency(10%) (Cap.Cost x 20%)	Estimated Property Costs	Construction Supervision(5%) & Force Account(3%) (Cap.Cost x 8%)	Total
Eastbound Connection	$ 31,500	$ 950	$ 6,300	$ 3,700	$ 2,550	$ 45,000
Westbound Connection	19,700	600	3,900	1,600	1,600	27,400
Pedestrian Passageway at Court Square	2,800	100	600	100	200	3,800
SUBTOTALS	$ 54,000	$ 1,650	$10,800	$ 5,400	$ 4,350	$ 76,200
MOFIDICATION TO EXISTING						
36TH STREET YARD	7,300	250	1,500	-	550	9,600
ROLLING STOCK	136,200	-	-	-	-	136,200
TOTALS	$197,500	$ 1,900	$12,300	$ 5,400	$ 4,900	$222,000

TABLE 2-16: MONTAUK TRANSFER ALTERNATIVE
CAPITAL COSTS
ALL PRICES IN 000's
OF 1983 DOLLARS

Segment	Capital Cost	Contractor Mobilization (Cap.Cost x 3%)	Administration(4%) Engineering(6%) Const.Contingency(10%) (Cap.Cost x 20%)	Estimated Property Costs	Construction Supervision(5%) & Force Account(3%) (Cap.Cost x 8%)	Total
63rd Street Tunnel to Portal	$ 36,700	$ 1,100	$ 7,400	$ 3,850	$ 2,950	$ 52,000
Thomson Transfer Station	24,000	700	4,800	0	1,900	31,400
Montauk Line Rehabilitation	111,700	3,400	22,300	0	8,900	146,300
Security Fence & Sound Barrier	11,000	350	2,200	0	850	14,400
Grade Separated Crossings	13,200	400	2,600	2,750	1,050	20,000
Rehabilitation of Richmond Hill Station	1,500	50	300	0	150	2,000
Rehabilitation of Hollis and Queens Village Stations	5,100	150	1,050	0	400	6,700
Rehabilitation of Locust Manor, Laurelton and Rosedale Stations	4,600	150	950	0	400	6,100
SUBTOTALS	$207,800	$ 6,300	$41,600	$ 6,600	$ 16,600	$278,900
MODIFICATION OF QUEENS VILLAGE TEAM TRACK YARD	4,000	100	800	-	300	5,200
MODIFICATON TO YARD 'A'	5,200	200	1,100	-	400	6,900
ROLLING STOCK (TA)	45,500	-	-	-	-	45,500
ROLLING STOCK (LIRR)	151,500	-	-	-	-	151,500
TOTALS	$414,000	$ 6,600	$43,500	$ 6,600	$ 17,300	$488,000

TABLE 2-17: MONTAUK/ARCHER ALTERNATIVE
CAPITAL COSTS
ALL PRICES IN 000's
OF 1983 DOLLARS

Segment	Capital Cost	Contractor Mobilization (Cap.Cost x 3%)	Administration(4%) Engineering(6%) Const.Contingency(10%) (Cap.Cost x 20%)	Estimated Property Costs	Construction Supervision(5%) & Force Account(3%) (Cap.Cost x 8%)	Total
63rd Street Tunnel to Portal	$ 36,700	$ 1,100	$ 7,400	$ 3,850	$ 2,950	$ 52,000
Thomson Station	14,900	450	3,000	0	1,150	19,500
Montauk Line Rehabilitation	101,600	3,050	20,300	0	8,150	133,100
Security Fence & Sound Barrier	10,300	300	2,100	0	800	13,500
Grade Separated Crossings	13,200	400	2,600	2,700	1,100	20,000
Rehabilitation of Richmond Hill Station	1,600	50	350	0	100	2,100
Connection to Jamaica 'EL'	4,700	150	950	150	450	6,400
Removal of 'EL' to Crescent Street	12,900	400	2,600	0	1,000	16,900
Station at Fresh Pond and Woodhaven	14,300	400	2,900	0	1,200	18,800
SUBTOTALS	$210,200	$ 6,300	$42,200	$ 6,700	$ 16,900	$282,300
THIRD TRACK, FRESH POND TO BLISS	29,300	900	5,900	500	2,400	39,000
FRESH POND FREIGHT YARD	16,500	500	3,300	0	1,300	21,600
MODIFICATIONS TO YARD 'A'	29,300	900	5,900	0	2,400	38,500
ROLLING STOCK	212,600	-	-	-	-	212,600
TOTALS	$497,900	$ 8,600	$57,300	$ 7,200	$ 23,000	$594,000

The surface transit operating cost model was structured in a manner similar to a model which was developed in 1979 for the MTA Management Study. During the development of the model, budget items were allocated to three physical characteristics of the surface transit system (bus miles, bus hour, and peak period buses) in an appropriate manner. The resulting costs for each physical characteristic were then divided by the value of these characteristics, for 1982/1983, to obtain a unit cost per physical characteristic. This is a standard methodology for developing a surface transit operating cost model and the result is normally called a "three factor model". The three factor modeling approach was selected because MTA bus operating costs are well established and there are no alternatives involving bus operating productivity changes (such as priority lane operation).

As with the rapid transit model, all operating cost and physical characteristics are for the Fiscal Year 1982/1983. MaBSTOA operations are excluded, since they are not significantly affected by the alternatives of the Queens Subway Options Study.

The rapid transit operating cost model separates costs into activity groups which have well-defined functions. Each of these activity groups are then related to one or more physical characteristics of the rapid transit system.

For these reasons, activity groups which relate to labor costs have special factors (multipliers) associated with each of the above costs. In general, the equations to estimate labor costs have the following form:

Labor Cost for Activity Group X = (Independent Variable) * (Direct Cost per Unit of Independent Variable) * (Staff Burden Multiplier) * (Fringe Benefit Multiplier) * (Direct Expense Multiplier) * (Rapid Transit General and Administrative Multiplier)

The six labor cost activity costs are as follows:

1) Vehicle Operating Labor: all costs associated with the operation of the rapid transit vehicles.

2) Station Operating Labor: all costs associated with the operation of the stations.

3) Station Maintenance Labor: all costs associated with the maintenance of the stations.

4) ROW and Systems Maintenance Labor: all costs associated with maintaining the rapid transit right-of-way, including track maintenance and electrical power system maintenance.

5) Vehicle Maintenance Inspection Labor: all costs associated with normal vehicle inspection and maintenance duties.

6) Vehicle Maintenance Labor: all costs associated with the repair and maintenance of rapid transit vehicles.

The model has a series of equations for labor cost activity groups (including transportation, maintenance of way and maintenance of equipment), a series of equations for direct cost activity groups, and an equation to estimate the rapid transit's share of NYCTA's general and administrative costs. The activity groups were defined in as detailed a manner as possible, in order to allow accurate forecasts which could be modified by policy or technological changes.

The communter rail operating cost model was developed by the Long Island Rail Road. The model is fairly detailed, taking into consideration the unique operating characteristics of a commuter railroad operation. As with the previous two models, operating cost has been separated by function; for this model, the functions were: (1) Transportation; (2) Maintenance of Equipment; (3) Maintenance of Way; and (4) Police. All operating costs and physical characteristics are for the Calendar Year 1983.

2.4.1(b) Levels of Uncertainty in the Operating and Maintenance Cost Estimates

During the course of the operating and maintenance cost model application, care was taken to consider the implications of all of the assumptions inherent in the models and to be aware of possible limitations of the models. The most important assumptions are:

1) that the productivity of the system remains constant;

2) that the costs are stated in "constant" 1982/1983 dollars; and

3) that the estimates are for the average system operating characteristics.

The assumption of constant dollars is a normal assumption used in most models which use cost as an independent variable. The models, as specified, contain constant productivity factors. For an established and large transit system, such as the NYCTA, changing these productivity factors should be done with extreme caution since technology, labor work rules, and management objectives all affect the productivity factors. There are sometimes obvious policy decisions or physical changes which can change productivity. For this study, changes in productivity were assumed to be small and consistent for each alternative and thus were not reflected in revised factors.

The third assumption, that values are for the average system, is an important assumption to recognize. The models are based on values that reflect, among other items, an average amount of deadhead time, a mix of full-time and part-time ticket booths and towers, and a mix of "old" and "new" equipment. Average system values were used for maintenance and propulsion costs per car mile even though the purchase of new cars will change these values. However, because the numbers of cars being added are relatively small, and because the vehicle type will not vary among alternatives, the assumption is considered reasonable.

A full description of the operating cost model is provided in Working Paper No. 8: Operating Cost Procedures - Operating Plans and Costs.

The level of uncertainty associated with the operating and maintenance estimates are reasonable for purposes of this study. Every effort was made to reduce uncertainty and accommodate "non-standard" situations, and evidence from a test application of the models suggested temporally stable models with relatively high degrees of accuracy.

2.4.2 Operating and Maintenance Costs

2.4.2(a) Estimates

The operating and maintenance (O&M) costs for each of the five alternatives consists of subway and bus components. In addition, the Montauk Transfer and Montauk/Archer alternatives have an LIRR cost component. Costs are presented in constant 1983 dollars, the latest year for which data were available to calibrate and validate the cost models used in this study.

The operating component of the costs includes personnel on cars, in towers and in stations, as well as propulsion energy costs. This accounted for 43 percent of the calibrated 1983 NYCTA costs and for 30 percent of LIRR costs. The maintenance component of the costs includes costs for 48 percent of the calibrated NYCTA costs and for 52 percent of LIRR costs. General and administrative costs for the NYCTA are nine percent, and 18 percent for the LIRR in 1983.

Table 2-18 presents the combined NYCTA, bus and LIRR O&M costs for each alternative. Except in one instance, these costs are generated by the three cost models prepared and calibrated for this study. The exception is a revision to track maintenance costs in the Montauk/Archer alternative. The cost of maintenance to the Montauk Branch is increased by $0.38 million to reflect the TA operating pattern with a greater number of trains running on the line than would be typical of LIRR service. The derivation of this increase is contained in Section 2.5, Comparative Discussion of Costs.

Table 2-18 also presents detail regarding the cost elements of each alternative for rapid transit, bus and LIRR operations where applicable. The first column contains the relevant systemwide costs from the 1983 budgets of the NYCTA and the LIRR. Rapid transit costs are derived from the NYCTA operating budget by subtracting the components associated with surface transit, construction administration and the South Brooklyn Railway Company. Similarly, bus costs are derived by subtracting the components associated with rapid transit, construction and the South Brooklyn Railway Company. The remaining five columns contain the incremental costs to provide the additional services required for each of the alternatives. Credits are taken where service is discontinued or abridged.

For rapid transit and LIRR, the transportation costs include: propulsion energy, labor to operate and control train movements and man stations. Maintenance of equipment includes costs to inspect and repair all types of cars. Maintenance of way costs include costs for track, signals and power. The LIRR would perform the Maintenance of Way (MOW) function and control operations on the Montauk Branch for both Montauk alternatives. Other costs include general and administrative, public liability and police.

TABLE 2-18

DETAILED INCREMENTAL OPERATING COSTS
(millions of 1983 dollars)

Description	Systemwide Costs-1983	No Additional Construction	Qns Blvd Local Connection	Qns Bypass Express	Subway/LIRR Montauk Trans.	Montauk/Archer Subway Conn.
RAPID TRANSIT						
Transportation	521.19	6.24	9.86	13.10	8.41	10.90
Maintenance of Equip.	256.16	3.17	6.22	11.06	4.57	9.22
Maintenance of Way	336.17	4.05	4.57	9.70	4.81	2.25
Other Costs	116.56	1.42	2.20	3.52	1.88	2.32
Subtotal	1,230.08	14.89	22.85	37.38	19.67	24.69
BUS						
NYCTA Feeder Bus	403.75	0.0	0.0	0.0	2.58	0.41
Private Feeder Bus	N.A.	0.13	0.13	0.13	0.13	0.88
Current Q49 Credit	.00	-1.24	-1.24	-1.24	-1.24	-1.24
Proposed Q49 Replace.	.00	.00	.00	.00	.00	1.14
Subtotal	403.75	-1.11	-1.11	-1.11	1.47	1.19
LIRR						
Transportation	121.39	.00	.00	.00	11.42	-.16
Maintenance of Equip.	122.26	.00	.00	.00	9.34	-.05
Maintenance of Way	90.97	.00	.00	.00	.78	1.26
Other Costs	72.36	.00	.00	.00	4.28	.13
Subtotal	406.82	.00	.00	.00	25.82	1.18
TOTAL (MILLIONS)	$2,040.82	$ 13.78	$ 21.74	$ 36.27	$ 46.98	$ 27.06

N.A. Not Available.

1983 bus costs shown are for the NYCTA lines only. Future costs for each of the five alternatives include costs of private bus operators as well. Private line costs are computed in the same manner as those of the public bus services. Credit for the elimination of the current Q49 bus service which replaced the demolished portion of the Jamaica Elevated line east of Queens Boulevard is taken in each alternative shown. This Q49 will be eliminated when the Archer Avenue subway begins operation. A new Q49 replacement service will be provided in the Montauk/Archer alternative to replace the portion of the J line between 121 Street and Crescent Street when the J train is terminated at Crescent Street. Credits for reduced J train service are taken in the O&M cost for the rapid transit portion of the Montauk/Archer costs while bus costs for the new Q49 are included.

2.4.2(b) Annual O&M Costs over Study Period

The horizon year for computing annual operating and maintenance (O&M) costs is the year 2000, by which time all five alternatives could be in service. The annual costs in constant 1983 dollars for the incremental service associated with each alternative are presented in Table 2-18.

Regardless of the alternative ultimately selected, the service plan associated with No Additional Construction will be implemented until operation on the selected alternative begins. The cost of each alternative is, therefore, the same as that of No Additional Construction for each year until the particular alternative commences service. The Local Connection service will begin in 1993, Queens Bypass in 1998, Subway/LIRR Transfer in 1995 and Montauk/Archer in 1997. The first full year of the No Additional Construction alternative would be 1986.

In the case of Montauk/Archer, J train service would be cut back to Crescent Street in the fall of 1994, when the connection between the Jamaica Avenue Elevated and the Montauk Branch is built. A new Q49 bus running on Jamaica Avenue between 121st Street and Crescent Street will replace the J train beginning in the fall of 1994 and offer free transfers to the J train at Crescent Street. The cost of the Montauk/Archer alternative includes the cost of this replacement bus for one-third of 1994 and for all following years.

2.5 Comparative Discussion of Costs

This comparative discussion of capital and operating costs for each of the five alternatives serves to highlight the difference in costs and the reasons behind the differences. This discussion is especially important as a prelude for Chapter 6 in which the evaluation of the alternatives is presented.

2.5.1 Capital Costs

The four "build" alternatives under consideration provide different levels of new transit service in Queens, each requiring a different level of capital facility construction. The physical characteristics of these new facilities is the major determinant of the final capital costs. In order to have a better understanding of the capital costs identified in Section 2.3, and summarized in Table 2-19, the characteristics of each alternative and the major aspects of the construction of the facilities will be presented.

TABLE 2-19

SUMMARY OF CAPITAL COSTS
(in 000's 1983 dollars)

Item	Queens Bypass	Local Connection	Montauk Transfer	Montauk Archer
Line and Stations	464,300	54,000	207,800	256,000
Yards and Maintenance Facilities	32,900	7,300	9,200	29,300
Rolling Stock	272,200	136,200	197,000	212,600
Right of Way	7,100	5,400	6,600	7,200
Mobilization	15,100	1,900	6,600	8,600
Admin., Engineering and Contingency	99,600	12,300	43,500	57,300
Supervision and Force Account	39,800	4,900	17,300	23,000
TOTALS	$ 931,000	$ 222,000	$ 488,000	$ 594,000

2.5.1(a) Queens Bypass Express

Some of the unique characteristics of this alternative that affect its cost are:

- The right-of-way is extremely narrow (45 feet $\pm$) with limited points of access for construction equipment. The route is bounded on the north by the LIRR Main Line on which service must be maintained and on the south by private property.
- Eighteen existing bridge structures along the route will have to be reconstructed including structures over the Brooklyn-Queens and Long Island Expressways.
- The segment of the line under Yellowstone Boulevard in Forest Hills must be constructed adjacent to and around an existing large sewer which must remain in operation.
- In the Long Island City area, the route crosses under all the existing tracks of the Sunnyside yard. Cut and cover construction will cause some of these tracks to be temporarily removed from service as the work progresses.
- No existing facilities will be utilized or incorporated into the new route.
- Construction cost of the facilities in this alternative will be approximately $660 million or about $21,000 per linear foot in 1983 dollars.

2.5.1(b) Queens Boulevard Line Local Connection

This alternative involves construction of a relatively short underground connection from the 63rd Street Tunnel to the existing Queens Boulevard line. The physical characteristics of this alternative are:

- Construction is confined to a narrow (25 feet $\pm$) trench for the bulk of construction. This trench will be over 40 feet deep in some locations.
- The construction must be done under and adjacent to the existing five track subway line where service must be maintained.
- No existing facilities will be utilized or incorporated into the new connection.
- Construction cost of the facilities in this alternative will be approximately $90 million or about $32,000 per linear foot in 1983 dollars.

2.5.1(c) Subway/LIRR Montauk-Transfer and Montauk/Archer Avenue Subway Connection

The physical characteristics of these two alternatives are similar. The following aspects are common to both alternatives:

- A new station will be constructed in the vicinity of Thomson Avenue in the Sunnyside Yard. The two level transfer station is more expensive than the single level Montauk/Archer Station, however this difference in cost is balanced by the more expensive yard leads required at the Montauk/Archer Station.

- o Each alternative will utilize and upgrade the existing LIRR Montauk Branch tracks.
- o Existing grade crossings will be eliminated and new grade separated structures built in both alternatives.

Additional characteristics of the Montauk/Archer alternative that make it slightly more expensive than the Transfer alternative are the addition of a third track for freight from Fresh Pond west to Greenpoint Avenue and a connection to and demolition of the existing Jamaica Elevated line. A comparison of costs show Montauk Transfer costing about $8,400 per linear foot and Montauk/Archer costing about $9,600 per linear foot in 1983 dollars.

2.5.2 Operating Costs

2.5.2(a) Introduction

The five alternatives and their incremental annual operating costs above current service in 1983 dollars are:

	Annual Operating Costs ($ Millions)
o No Additional Construction	13.78
o Queens Bypass Express	36.27
o Queens Boulevard Line Local Connection	21.74
o Subway/LIRR-Montauk Transfer	46.98
o Montauk/Archer Avenue Subway Connection	27.06

Operating costs for rail service depend on a number of factors, including:

- o the number of trains operating,
- o the consist (the number of cars in each train),
- o the length of the route,
- o the average speed over a particular route,
- o the amount of off-peak service relative to peak,
- o credits for discontinued operations, and
- o quality of service.

The above factors are generally self-explanatory. The No Additional Construction, Local Connection and Montauk Transfer alternatives differ from the Queens Bypass Express and Montauk/Archer alternatives in that the latter two alternatives provide additional Seventh Avenue service (QB). This increases the NYCTA costs for these two alternatives.

An important consideration which differentiates the five alternatives is the relative amount of peak and off-peak service. The tabulation below shows the ratio of peak revenue car-miles to total revenue car miles for current service and the five alternatives. The data is based on the following trains: B (to Queens), K, E, F, GG, J, N and QB. Lower values of the ratio indicate alternatives that provide more service throughout the day.

	Peak Revenue Car-miles / Total Revenue Car-miles
Current Service	28.5%
No Additional Construction	28.4%
Queens Boulevard Line Local Connection	31.3%
Queens Bypass Express	25.9%
Subway/LIRR-Montauk Transfer	28.4%
Montauk/Archer Avenue Subway Connection	30.9%

The credits in operating costs principally involve the discontinuance of J train service beyond Crescent Street in the Montauk/Archer alternative. However there are other credits, such as those for the discontinuance of three LIRR diesel passenger trains in the Montauk Transfer and Montauk/Archer alternatives.

Quality of service refers to inherent differences between a transit operation like the New York City subways and a conventional railroad passenger operation like the Long Island Rail Road. For example, LIRR service, such as the Queens-oriented service, is designed to provide seats for nearly all passengers. In contrast, a subway car at practical capacity can provide only about one-third of the passengers with seats.

There are also differences in bus costs between the systems, but these are smaller than the differences in rail costs. All alternatives are credited by about $1.2 million for the discontinuance of the Q49 bus which has replaced the demolished Jamaica Aenue Elevated, east of the Queens Boulevard Station. This bus will not be needed when the connection between the Archer Avenue subway and the Jamaica Avenue Elevated is made. Very little is changed otherwise in the bus operations for No Additional Construction, Local Connection and the Queens Bypass Express.

The Montauk Transfer requires a substantial feeder bus network to the five outlying stations on the LIRR to be serviced by the Queens-oriented trains. Buses meet each train at each station. The cost for this is about $2.6 million more than that of No Additional Construction.

The Montauk/Archer alternative also has new feeder bus costs for the new stations on the Montauk Branch. In addition, a new Q49 bus service will replace the portion of the J line between 121st Street and Crescent Street. The $1.1 million cost of this service is much less than the credits received for terminating the J line at Crescent Street.

2.5.2(b) No Additional Construction

In this alternative, a minimum of additional service is provided by extending the route of existing B trains through the 63rd Street Tunnel. No extra mileage is incurred by running trains in Brooklyn, as is the case for some of the new services in other alternatives lacking a suitable Manhattan terminal. The service operates all day long.

Because No Additional Construction provides the least frequent and shortest service, it is the lowest cost alternative.

2.5.2(c) Queens Bypass Express

The Queens Bypass Express alternative has the largest increase in service and the greatest increase in car mileage of the five alternatives. There are 16 additional trains in the peak hour from Jamaica to Manhattan and Brooklyn. Most of the increased car mileage is due to Sixth Avenue and Broadway - Seventh Avenue service added to the Queens Bypass Express, less a credit for reduced Queens Boulevard service. Through service between Manhattan and Jamaica via the Queens Bypass Express is available at all times except during the midnight period. During the midnight period, shuttle service is available from Manhattan to Northern Boulevard where passengers can transfer to the Queens Boulevard line.

Approximately 12 percent of the total car mileage for the Queens Bypass Express alternative is incurred for Brooklyn service. This car mileage is generated by new peak-hour Broadway - Seventh Avenue service to Coney Island. These trains must operate to Brooklyn because there is not sufficient turning capacity in lower Manhattan, nor is there any available midday storage in midtown or lower Manhattan.

The Queens Bypass Express alternative offers approximately the same number of additional trains per hour as the Montauk/Archer alternative, but the subway O&M costs are approximately $12,700,000 greater. The prime reason the Montauk/Archer is cheaper to operate is the credit for discontinuing a portion of the J line, the LIRR diesel trains to Long Island City and five LIRR stations on the Montauk Branch. The right-of-way maintenance cost (labor and material) for the Bypass Express is over $9,000,000, representing 24.8 percent of the total subway cost. This alternative has the greatest amount of additional track.

2.5.2(d) Queens Boulevard Line Local Connection

The current GG service between Queens and Brooklyn is replaced by two new services which use the 63rd Street Tunnel. One is an extension of the B train, which now terminates at 57th Street in Manhattan, to Jamaica. The other is a new peak-period-only service between Second Avenue in Manhattan and Jamaica. Thus, six GG local trains in the peak-hour are replaced with twelve local trains to Manhattan.

The Local Connection alternative provides the same level of service as the No Additional Construction alternative during off-peak hours. During peak hours, the Local Connection has more trains and riders on the Queens Boulevard line. Thus, the cost increment between these two alternatives is attributable primarily to the increase in peak-hour service.

2.5.2(e) Subway/LIRR-Montauk Transfer

The Montauk Transfer alternative has two rail components, NYCTA and LIRR. The NYCTA component is similar to the No Additional Construction alternative except that 63rd Street Tunnel trains are extended to the Thomson Avenue transfer station with the LIRR Queens-oriented service. The frequency of Sixth Avenue service to Long Island City is increased from eight to twelve trains in the peak hour, as a result of the greater ridership for this alternative.

The LIRR cost component is associated with the operation of the Queens-oriented service which serves Queens Village and Hollis on the Main Line and Rosedale, Laurelton and Locust Manor on the Atlantic Branch, as well as Jamaica and Richmond Hill on the Montauk Branch. Service is provided by MU trainsets composed of eight cars in peak periods and four cars in off-peak periods. The operating cost also includes credits for three diesel trains that are deleted west of Jamaica and four Montauk Branch stations that are no longer required.

The Queens-oriented service is a major addition to LIRR operations. Peak-hour peak-direction trains increase by about 25 percent. Systemwide MU car miles increase by 12.4 percent. The total MU fleet increases by 13 percent. The Queens-oriented service increases total LIRR operating costs by 6.3 percent.

The Montauk Transfer alternative has the highest operating cost of all the alternatives, but also is the only alternative which increases rail transit service to eastern and southeastern Queens. The LIRR Queens-oriented service represents approximately 55 percent of the total cost. The LIRR service has 37 percent more car miles than the subway service, but this alone does not account for the higher costs.

A major reason that the LIRR costs represent a substantial portion of the total cost is that the LIRR service is a traditional railroad service, qualitatively different than subway service. The LIRR trains will provide seats for nearly all passengers. Practical subway car capacities are about 80 percent higher, but only about one-third of the maximum number of subway riders are seated. Queens-oriented trains have an engineer plus a conductor, assistant conductor and two collectors on board for fare collection. TA trains have only a motorman and conductor. There is also a wage rate differential.

The Montauk Transfer alternative also has a higher cost for bus service, to serve the five outlying Queens stations.

2.5.2(f) Montauk/Archer Avenue Subway Connection

The Montauk/Archer alternative includes Sixth Avenue service (B and K) for all times except the midnight period, plus Broadway-Seventh Avenue service (QB) only in the peak period. There is no service between 11:00 PM and 5:30 AM on the Montauk Branch which allows the Long Island Rail Road to perform certain freight operations. The J train is cut back to Crescent Street. The N train is extended to 179th Street during peak hours.

Approximately four percent of the car mileage in this alternative is incurred for Brooklyn service. This car mileage is generated by new peak-hour

Broadway - Seventh Avenue service (QB) to Coney Island. As in the case of the Queens Bypass Express alternative, there is no turning capacity or midday storage available in lower Manhattan.

The cost of bus service includes a new Q49 route to replace curtailed J train service. Twelve buses per hour run between 121 Street (Richmond Hill) and Crescent Street.

The Montauk/Archer alternative provides 50 percent more peak-hour service through the 63rd Street Tunnel than the Local Connection (18 versus 12, excluding JFK service). In addition, Montauk/Archer provides five additional off-peak trains per hour, except during the midnight period at which time there is no service on the Montauk Branch. The incremental subway cost of Montauk/Archer is similar to the Local Connection. The primary reasons for this similarity are: savings related to the curtailment of J train service at Crescent Street, and the higher average speed on the line. However, the LIRR would maintain the Montauk Branch in this alternative. Thus, the track maintenance costs are included in the LIRR cost estimate. The LIRR cost component of Montauk/Archer also includes credits for three diesel trains that are discontinued when the Montauk Branch is converted to subway operation and for the elimination of five stations along the branch.

Including bus costs, the Montauk/Archer alternative is $5.72 million more than the Local Connection alternative.

3.0 ENVIRONMENTAL SETTING

3.1 Regional Perspective

Queens County occupies a crucial position in the New York Metropolitan region. It is the eastern most borough of New York City and is adjacent to suburban Long Island. It has a large population base which provides a substantial proportion of the labor force needed to insure the City's economic health and a sizable economic base of critical importance to the region.

Much of the existing physical, social and economic character of the borough and its individual neighborhoods has been shaped by transportation improvements which have expanded linkages between the borough and the rest of the City -- i.e., roadways providing circulation within the borough, ferry service linking Queens to Manhattan, the construction of bridges and tunnels, the expansion of rail transit, and the expansion of the regional highway network.

Queens is the largest of the five New York City boroughs in land area (encompassing approximately 115 square miles), second largest in population (after Brooklyn) and second largest (after Manhattan) in the number of private sector jobs (having surpassed Brooklyn in 1978). Queens is also a borough of home-owners, possessing the second greatest percentage of owner-occupied housing units (after Staten Island) and by far the greatest number of owner-occupied units. The borough contains almost half of all the single- and two-family homes in New York City. Its housing stock also contains vast garden apartment complexes along with large public housing, middle income and luxury apartment developments. Though predominantly residential, Queens has extensive and important commercial and industrial areas. The borough also contains vast stretches of open space including many small and large parks and cemeteries.

3.1.1 Trends in Population, Housing, Employment and Economic Activity

As described in Section I-C of Working Paper No. 15: Baseline Report (July 1983), trends in population, housing, employment and economic activity indicate that Queens is perhaps the most stable of the five boroughs, experiencing neither the explosive growth of Manhattan and Staten Island nor the contractions of the Bronx and Brooklyn. That relative stability, however, does not mean lack of change. While the population of the Borough declined by about five percent between 1970 and 1980 -- half the City-wide rate of decline -- major population shifts were taking place in certain neighborhoods as waves of Asian and South American immigrants moved into the Borough. This has been particularly pronounced in Community Districts 3, 4 and 7. While the number of dwelling units increased during the decade by a modest 4.5 percent, there was a surge of co-op conversion and condominium development, which was affecting the Borough's housing stock. In terms of the Borough's job base, the number of private sector jobs remained near 400,000 during the past ten years. During this period, substantial gains in service and finance, insurance and real estate (FIRE) offset sizable losses in manufacturing and wholesale/retail trade (see Table 3-1). The Borough

TABLE 3-1

EMPLOYMENT TRENDS*
QUEENS COUNTY
1971 - 1982

Industry	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971
All Industries	383.5	381.7	374.4	377.6	374.4	368.5	369.0	371.2	392.0	400.9	395.4	385.6
Manufacturing	77.1	82.5	82.6	85.5	86.4	86.2	87.6	86.4	98.8	104.4	104.4	106.3
Construction	22.8	20.8	20.4	19.1	17.6	16.3	16.7	19.8	23.0	23.6	22.7	22.2
Transportation & Public Utilities	65.6	66.8	67.3	69.4	69.2	69.4	69.2	67.2	68.5	71.3	70.4	67.9
Wholesale/Retail Trade	95.1	94.7	95.8	97.6	99.4	99.6	99.6	101.7	105.5	106.8	105.4	104.3
Finance, Insurance & Real Estate	21.4	22.3	19.7	19.4	19.2	18.7	19.2	18.9	19.5	19.5	19.2	18.7
Services	99.5	92.8	86.8	85.0	81.6	77.4	76.0	76.0	75.7	74.0	72.0	65.1
All Other	1.7	1.8	1.8	1.6	1.0	0.9	0.7	1.0	1.1	1.2	1.2	1.2

*Annual Average insured employment by major industry division -- private sector only.
NOTE: Data in thousands

Source: Real Estate Board of New York, based on data supplied by New York State Department of Labor.

has also emerged as the second largest center for film production in the country, with the restoration and expansion of the Astoria Pictures Studio and the pending completion of the Silvercup Studios.

Numerous developments currently under construction or in planning promise to generate additional changes in the Borough over the next several years. These include: the Port Authority of New York and New Jersey's $500 million, fifteen-year development plan for La Guardia and Kennedy Airports; the development of a shopping mall on the site of the Alexander's parking lot in Rego Park, which will include a Sears Roebuck store, the development of a new office building to house functions of the Social Security Administration and the conversion of the former Gertz Department Store to office use in Jamaica; the creation of an International Design Center to house the now Manhattan-based home design and decorating industry in the complex formerly occupied by American Chicle in Long Island City; potential development on the Hunter's Point waterfront sponsored by the Port Authority, and the possible development of a major new sports complex in the Borough. On a neighborhood level, commercial revitalization activities, which have taken root in many of the Borough's neighborhood shopping areas, could help stabilize the Borough's retail base.

3.1.2 Overall Transportation Network

For the most part, the transportation network in Queens is designed to accommodate travel to Manhattan. The Brooklyn Manhattan Transit (BMT), Independent (IND) and Interboro (IRT) rapid transit lines run east to west with East River crossings at 60th, 53rd and 42nd Streets in Manhattan. Long Island Rail Road lines in Queens also provide service to Manhattan on the Port Washington Branch, Main Line, Atlantic Branch and Montauk Branch. The New York City Transit Authority operates 278.9 route miles of bus lines in the borough, in addition to operating the subway lines. The bus routes provide intra-Queens travel with lines that run north-south and east-west, and express service to Manhattan. Five privately owned and operated bus lines in the borough provide intraborough and express service to Manhattan. Five privately owned and operated bus lines in the borough provide intraborough and express service to Manhatten.

The highway network in Queens is extensive compared with that of the other boroughs. The main east-west route is the Long Island Expressway. The Grand Central Parkway via the Triborough Bridge is also an important route into Manhattan, the Bronx and points beyond. The Grand Central, along with the Van Wyck Expressway, also provide north-south access in central Queens. Queens is connected to western Brooklyn via the Brooklyn-Queens Expressway. Other major north-south highways are the Cross Island Parkway, the Clearview Expressway and the Whitestone Expressway, all of which feed the two Long Island Sound crossings at the Throgs Neck Bridge and the Bronx-Whitestone Bridge. In southern Queens, the Southern State Parkway and Sunrise Highway are important east-west routes.

3.2 Impact Study Areas

Two kinds of impact study areas are designated for this analysis. One includes the immediate area within 1,000 feet on either side of the various transit alignments and consists of a number of narrow corridors through the borough. Direct impacts of the various transit alternatives can be expected to occur in the study corridors. The other impact study area is important in the analysis of indirect impacts and include all community planning districts in Queens through which the transit alternatives pass.

3.2.1 Impact Study Corridors

The study corridors, which amount to bands of nearly one-half mile through the borough, all begin at the Queens end of the 63rd Street Tunnel in Long Island City (see Figure 3-1). The study corridor for the No Additional Construction alternative is limited to that stub end and the Hillside Connector and Archer Avenue subway.

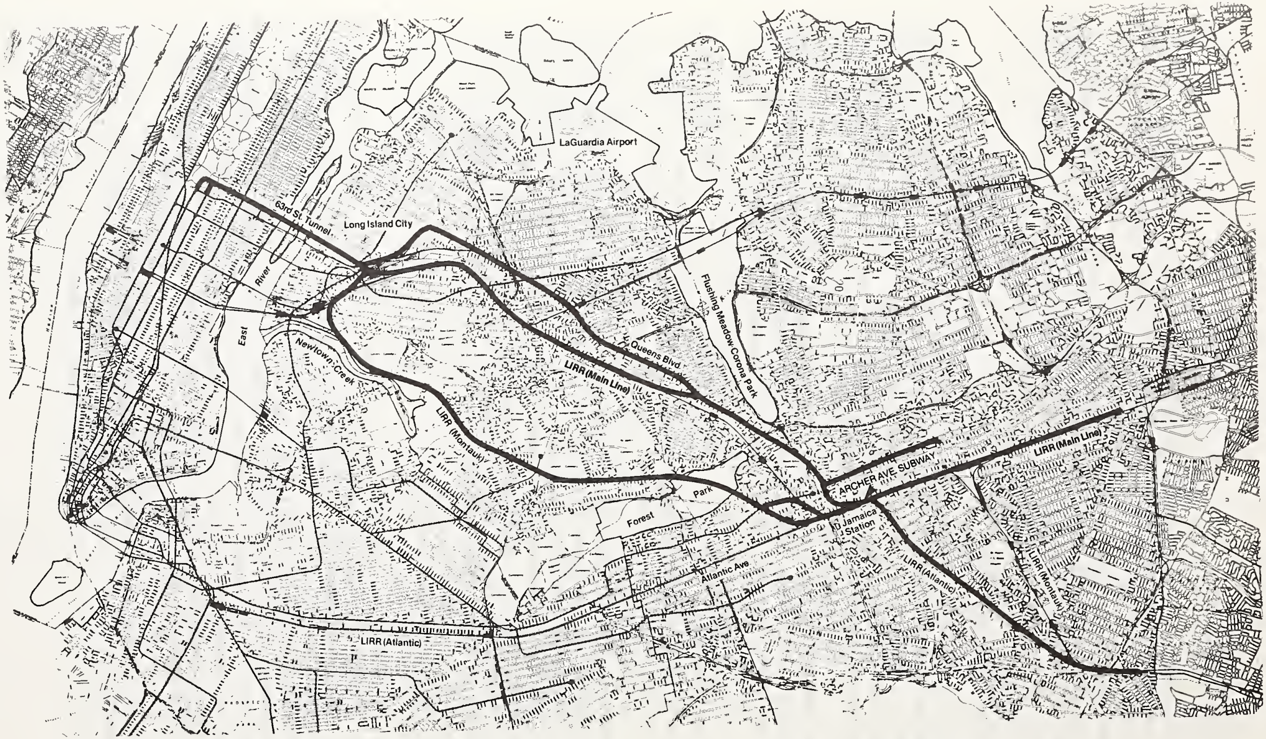
The Queens Bypass Express study corridor starts in the Sunnyside Yards and follows the LIRR Main Line through Woodside, Elmhurst and Rego Park. In Forest Hills, the study corridor is along Yellowstone Boulevard for a short distance, until it connects to the existing Queens Boulevard subway line. Under the Queens Boulevard Line Local Connection option, the study corridor extends all along the local tracks of the Queens Boulevard subway line from Long Island City, past Jackson Heights and the 71st-Continental Avenues Station to the end of the line at 179th Street in Jamaica.

The study corridor for the Montauk alternatives moves to the south from Long Island City along Newtown Creek and into the industrial areas of Maspeth. The other areas the corridor passes through are Ridgewood, Glendale, Forest Park, Richmond Hill and Jamaica. The Montauk Transfer alternative corridor extends south and east of Jamaica into Hollis and Queens Village along the LIRR Main Line and to Springfield Gardens, Laurelton and Rosedale along the LIRR Atlantic Branch.

3.2.2 Community Districts

The Community District impact study area includes the community districts through which the various alternatives pass. The five rail alignments pass through ten community districts in Queens (See Figure 3-5): Community Districts 1, 2, 3, 4, 5, 6, 8, 9, 12, and 13. Impacts of the different alignments are most likely to occur in these districts. All neighborhoods in each of the community districts listed above are included in the study area except for outlying neighborhoods in Community Districts 8 and 13, although demographic data and other material is presented for the entire district. The following list presents the neighborhoods which are in the community district study area.

Community District 1 -- Astoria (including Ditmars and Steinway);
Community District 2 -- Long Island City, Sunnyside, and Woodside;
Community District 3 -- Jackson Heights and Elmhurst;



IMPACT STUDY CORRIDORS Figure 3-1

Legend

Alignment of Options

0 6000
Scale in Feet
N

Community District 4	--	Elmhurst and Corona;
Community District 5	--	Maspeth, Middle Village, Ridgewood, and Glendale;
Community District 6	--	Rego Park and Forest Hills;
Community District 8	--	Briarwood, Jamaica Hill, and Jamaica Estates;
Community District 9	--	Woodhaven, Kew Gardens, and Richmond Hill;
Community District 12	--	Jamaica, South Jamaica, Hollis, St. Albans, and Springfield Gardens North; and,
Community District 13	--	Bellerose, Queens Village, Cambria Heights, Laurelton, Springfield Gardens, and Rosedale.

Table 3-2 identifies the communities which may be affected by the various options due to alignments passing through or adjacent to the community. These neighborhoods are close enough to the proposed alignments and to planned stations to be directly affected by potential impacts.

3.3 Transportation

The Queens transportation network, and its relationship to the overall New York regional system is described in Section 3.1.2 above. The rail transit and commuter rail systems are, for the most part, east-west oriented and accomodate travel in the high-volume Long Island-Queens-Manhattan corridor. Major routes in the highway and arterial street system also serve Queens-Manhattan trips, however, as indicated above, the road network contains important north-south arteries as well.

The following sections describe the existing travel patterns, rail transit service characteristics, rail freight operations and arterial and local street segments which could be impacted by the proposed Queens subway alternatives.

3.3.1 Existing Travel Patterns

The entire ridership estimation process for the Queens transit study is based on the assumption that travel demand within the study area is essentially rational and predictable. Thus, by examining present transportation supply and the associated response patterns of the population, it is possible to estimate with reasonable accuracy, future consumer responses to proposed changes in the transportation supply. In addition, analysis of existing travel patterns provides an important benchmark by which to evaluate the relative merits of alternative systems.

The study was completed with the benefit of 1980 Census data. The Census provides the best picture of travel patterns within the study area and supports earlier decisions made concerning the orientation of the study.

3.3.1(a) Work Trip Travel

The travel demand study area included the Boroughs of Queens, Brooklyn and Manhattan as well as Nassau and Suffolk Counties. The 1980 Census

Table 3-2

COMMUNITIES AFFECTED BY EACH OPTION

Community Districts and Neighborhoods	No Additional Construction	Queens Bypass Express	Queens Blvd. Line--Local Connection	Subway/LIRR Montauk Transfer	Montauk Line/ Archer Avenue Subway
Community District 1					
Ditmars			X		
Astoria			X		
Steinway			X		
Long Island City	X	X	X	X	X
Community District 2					
Long Island City	X	X	X	X	X
Sunnyside		X			
Woodside		X	X		
Community District 3					
Jackson Heights			X		
Elmhurst		X	X		
Community District 4					
Elmhurst		X	X		
Corona		X			
Community District 5					
Maspeth				X	X
Middle Village				X	X
Ridgewood				X	X
Glendale				X	X
Community District 6					
Rego Park		X	X		
Forest Hills		X	X		
Community District 8					
Briarwood	X	X	X		
Jamaica Hill		X	X		
Jamaica Estates		X			
Community District 9					
Woodhaven				X	X
Kew Gardens	X	X	X	X	X
Richmond Hill	X			X	X
Community District 12					
Jamaica	X	X		X	X
South Jamaica	X	X		X	X
Hollis		X		X	
St. Albans				X	
Springield Gardens North				X	
Community District 13					
Bellerose				X	
Queens Village				X	
Cambria Heights				X	
Laurelton				X	
Springfield Gardens				X	
Rosedale				X	

journey to work data for the three New York City area SMSA's show three times as many work trips leaving Queens as entering Queens and nearly the same ratio for Nassau and Suffolk Counties. This results in a daily flow of work trips from Queens of over 500,000 person trips. According to the 1980 Census, Manhattan attracts 70 percent of these trips, and Brooklyn attracts 13 percent. Suburban areas attract less than ten percent of Queens work trips, though Nassau and Suffolk Counties attract most of these. Manhattan attracts 44 percent of Nassau County's work trips, and Queens attracts 24 percent. Similarly, 51 percent of the work trips leaving Suffolk County are destined for Nassau County, 14 percent for Queens, and 21 percent for Manhattan. Thus, the study area is characterized by travel to Manhattan. Work trips to Manhattan from Queens, Nassau, and Suffolk Counties amount to over 500,000 daily person trips, almost 20 percent more than all work trips leaving Queens, Nassau, and Suffolk Counties and going to all other destinations combined.

3.3.1(b) Non-Work Travel

A source of information concerning non-work travel is the 1979 Citywide Origin-Destination Survey conducted at subway stations. During the 6 AM to 2 PM time period that the survey covered, non-work travel accounted for 21 percent of total travel systemwide, which is a reasonable estimate of non-work travel as a percentage of the total. During the peak hour, only approximately 10 percent of travel was for non-work purposes. The primary purpose of subway travel is clearly for work related trips, and so the emphasis of the study was to orient new service to work travel patterns and to relieve peak hour overcrowding. Service designed for work travel is likely to meet requirements for other trip purposes, as well.

3.3.1(c) Transit Utilization

Table 3-3 summarizes some of the 1980 Census travel data and shows the dependence on transit of commuters to Manhattan and the relative importance of Manhattan as the primary work destination. The largest share of work trips being made are those from Queens to Manhattan, and the greatest transit utilization, 81 percent, is realized for this movement. Work trips that remain in Queens account for the next largest share of trips, but the utilization of transit is only 26 percent. However, 17 percent of work trips in Queens are walk trips. Work trips to Queens from Nassau and Suffolk County amount to approximately 83,000 daily trips, but only nine percent by transit, most of which is commuter rail. Most of the work trips from Nassau and Suffolk Counties continue through Queens to Manhattan, however, and are 71 and 68 percent transit, respectively. Work trips from Manhattan to Queens are made 64 percent by transit but represent only a small fraction of the trips between Queens and Manhattan, and só, by serving work trips entering Manhattan, adequate service for trips leaving Manhattan is practically assured.

Examination of existing travel and tripmaking factors along with delineation of current transit system and service characteristics provide the basis for subsequent evaluation of proposed subway improvement options.

TABLE 3-3

JOURNEY TO WORK DATA FOR THE PRIMARY STUDY AREA
(1980 CENSUS)

Residence	Work Place	Total Work Trips 1/	Transit Work Trips 2/	Percent Transit
Queens	Manhattan	365,100	295,250	81
Nassau	Manhattan	110,320	78,810	71
Suffolk	Manhattan	35,690	24,100	68
		511,110	398,160	78
Queens	Queens	304,110	80,260	26
Manhattan	Queens	18,510	11,760	64
Nassau	Queens	58,790	4,340	7
Suffolk	Queens	24,150	3,070	13
		82,940	7,410	9

Source: 1980 Census Comparisons No. 2, Journey to Work by Means of Transportation, New York Metropolitan Transportation Council.

1/ Trips are not strictly defined as daily trips so that the numbers, while of the correct order of magnitude, are not exact.

2/ Transit includes bus, rail and subway.

Due to overcrowding and operational complexity, the current schedule of 30 trains per hour is not met and the average throughput on E and F service is 26 trains per hour.

3.3.2 Rail Transit Service Under No Additional Construction

The No Additional Construction alternative is used as the baseline against which each of the other alternatives is compared. It includes the following committed projects nearing completion -- the Archer Avenue Subway, Hillside Connector and the 63rd Street Tunnel to 21st Street. These projects will be opened for service by early 1986. Alterations to the system under each of the other alternatives build upon these committed projects. Under this alternative, current delays in the schedule will get worse.

3.3.2(a) Operating Characteristics

New stations in Queens will be opened for service at 21st Street (Long Island City), Jamaica-Van Wyck, Sutphin-Archer and Parsons-Archer, in addition to Roosevelt Island and Lexington-63rd Street in Manhattan. The opening of the Parsons-Archer, Sutphin-Archer and Roosevelt Island stations will provide direct transit access to 18,170 people presently not within walking distance (0.8 miles) of any existing rapid transit station.

Operating characteristics of the No Additional Construction alternative are summarized in the tables of this section. Table 3-4 summarizes the routings, terminals and stopping patterns for all subway lines affected. Table 3-5 shows the frequency of each service in trains per hour for five periods during the day; the morning and evening rush hours, midday, evening and night hours.

3.3.2(b) Levels of Service

Annual passenger minutes of time savings from various neighborhoods in Queens to Manhattan are shown in Table 4-7 in Section 4.1 Also shown are the number of trips originating in each district and the average travel time per trip.

Travel time includes time spent walking, riding a bus or train, and transferring from one mode to another. Walking speed is 2.5 miles per hour and bus speed is 12 miles per hour. Transfer time is calculated as one-half the headway of the service to which the passenger is transferring.

The number of passengers making zero to two transfers to reach their Manhattan destination indicates the convenience and directness of the bus and rail service provided. Transfers counted are between different modes of travel and between different services within a mode of travel. This is displayed in Table 4-5 of Section 4.1.1.

3.3.2(c) Patronage

An important first step in the study was the determination of peak hour volumes for both the NYCTA and LIRR systems. For the subway system, 1980

TABLE 3-4

PEAK HOUR SUBWAY ROUTINGS AND STOPPING PATTERNS
NO ADDITIONAL CONSTRUCTION

		Queens				Manhattan			
Queens Terminal	Train*	Queens Route	No. of Trains	Stop Pattern	Crossing	Manhattan Route	Stop Pattern	Brooklyn Route	Other Terminal
21 Street	B	L.I. City	5	Local	63 Street	6 Avenue	Local	West End	Coney Island
21 Street	K	L.I. City	3	Local	63 Street	6 Avenue	Local	-	2 Avenue
Parsons-Archer	E	Queens Blvd.	13	Express	53 Street	8 Avenue	Local	-	WTC
179 Street	F	Queens Blvd.	13	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	E	Queens Blvd.	2	Express	53 Street	8 Avenue	Local	-	WTC
71-Continental	F	Queens Blvd.	2	Express	53 Street	6 Avenue	Local	Culver	Coney Island
71-Continental	GG	Queens Blvd.	6	Local	-	-	-	Cross-Bklyn	Smith-9 Street
Parsons-Archer	J	Jamaica El.	12	Local	Williamsburg Bridge	Nassau-Chambers	Local	-	Broad Street
21 Street	JFK	L.I. City	3	Local	63 Street	6 Avenue	Express (on Local tracks)	Fulton	Howard Beach-JFK
179 Street	N	Queens Blvd.	14	Local	60 Street	Broadway	Local	Sea Beach -	Coney Island (8) Whitehall St (6)

* B and K represent the same Queens service.

TABLE 3-5

OPERATING FREQUENCIES
NO ADDITIONAL CONSTRUCTION

Service[1]	Queens Terminal	Frequency in Trains per Hour: Peak AM/PM	Midday 1200	Evening 2100	Night 0200	Remarks
B	21 Street	5	6	5	3*	Present Terminal - 57th Street/6 Avenue. * B Shuttle from 50 Street-6 Avenue to 21 Street.
K	21 Street	3	-	-	-	New Service to 2 Avenue, Manhattan.
E	Parsons-Archer	15	6	5	3	Present Terminal - 179 Street. Two peak-hour put-ins at 71st-Continental.
F	179 Street	15	6	5	3	No change from current schedules. After 7:17 PM runs local from 179 Street to 71-Continental. After 10:00 PM runs local from 179 Street to Queens Plaza. Two peak-hour put-ins at 71-Continental.
GG	71st-Continental		6	6	5	3
J	Parsons-Archer	12	6	5	3	Present Terminal - Queens Boulevard.
JFK	21 Street	3	3	3	-	Present Terminal - 57th Street/6 Avenue.
N	179 Street	14*	6	-	-	Present Terminal - 71st-Continental. Last train departs 179 Street at 7:17 PM. Midday trains terminate at 71st-Continental.

1 See footnote - Table 3-6

* Coney Island (8) and Whitehall Street (6).

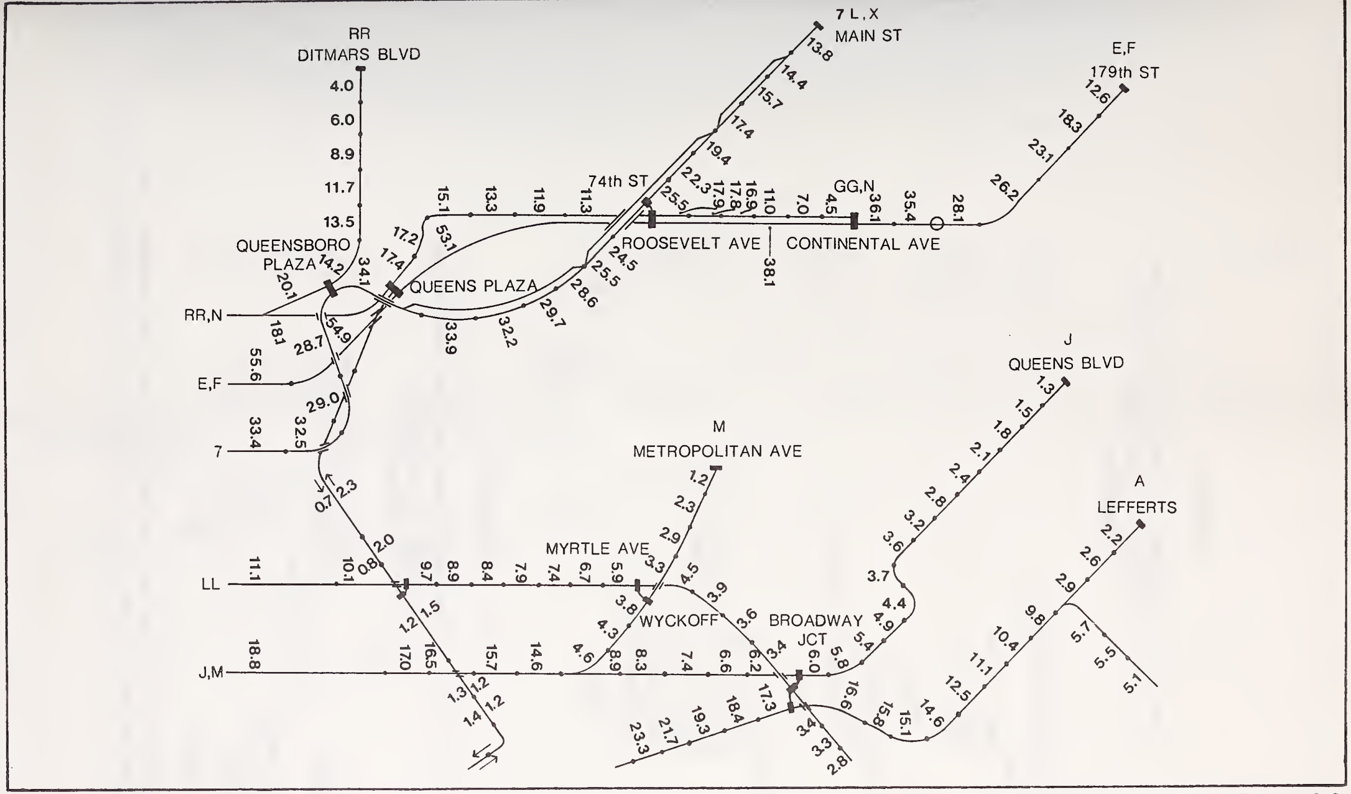
patronage was developed from a variety of sources. This included information from the Tri-State Regional Planning Commission (TSRPC) Hub Count and NYCTA Rapid Transit Service Sufficiency Study O & D Survey as well as turnstile counts routinely compiled and reported by NYCTA. The primary data source for the LIRR was the parking survey which tabulated riders by originating station for the morning peak hours as well as the TSRPC Hub Count data. The results for this four hour period were converted to peak hour patronage based on the observed ridership distribution by time of day. The peak hour accounts for approximately half of all riders during the four morning peak hours.

By combining results from the various data sources, 1980 inbound peak hour patronage volumes were determined. In terms of the calibration process, these demand levels are termed actual since they are based on various counting and survey techniques such as the Hub Count and O & D Survey indicated above. It should be recognized that some computations were required to arrive at patronage volumes for the 1980 calibration year. Nonetheless, the ground count numbers provide a reasonably accurate and current picture of transit riding and usage by station, link and line within the study area.

Transit services considered in the current analysis include the entire LIRR system and all subway lines operated in Brooklyn and Queens. NYCTA routes examined in detail include the subway routes operated on three Queens East River crossings (42nd, 53rd and 60th) and the two northernmost crossings in Brooklyn (14th Street and Williamsburg Bridge). In addition, the GG crosstown route was included in the intensive study area since it operates along the Queens Boulevard Line and serves as a feeder to other subway routes. Inclusion of the LL, J and M routes in the current study represents an expansion of the detailed study area from the Phase I analysis. This reflects the potential diversion of residents in the northern tier of Brooklyn with certain alternatives. It should be recognized that the other subway lines to the south were also examined but to a far lesser extent.

As shown in Figure 3-2, the Queens East River crossing accounts for 127,200 inbound peak hour trips. The 53rd Street Tunnel which is utilized by both Queens Boulevard express subway services (E and F), carries the largest number of passengers. Reflecting the commuter orientation of subway riders, patronage increases as each route proceeds west. With the exception of the Flushing Line, the maximum load point for all routes is at the East River. Extensive transferring at Queensboro Plaza accounts for the highest volume on this line observed east of this transfer station. Ridership on routes utilizing the two northern Brooklyn East River crossings experience a similar pattern with higher volumes with decreasing distance to Manhattan. A total of 30,000 riders use the LL, J and M routes at the East River cordon. A summary of inbound peak hour ridership for East River crossings in the intensive study area as well as locations to the south are presented in Table 3-6.

Ridership levels for the entire LIRR system are presented in Figure 3-3. Similar to the results for the NYCTA, ridership is cumulative from the



1980 NYCTA STATION AND LINK VOLUMES INBOUND A.M. PEAK HOUR (THOUSANDS) Figure 3-2

TABLE 3-6

1980 NYCTA RIDERSHIP BY EAST RIVER CROSSING
INBOUND AM PEAK HOUR
(THOUSANDS)

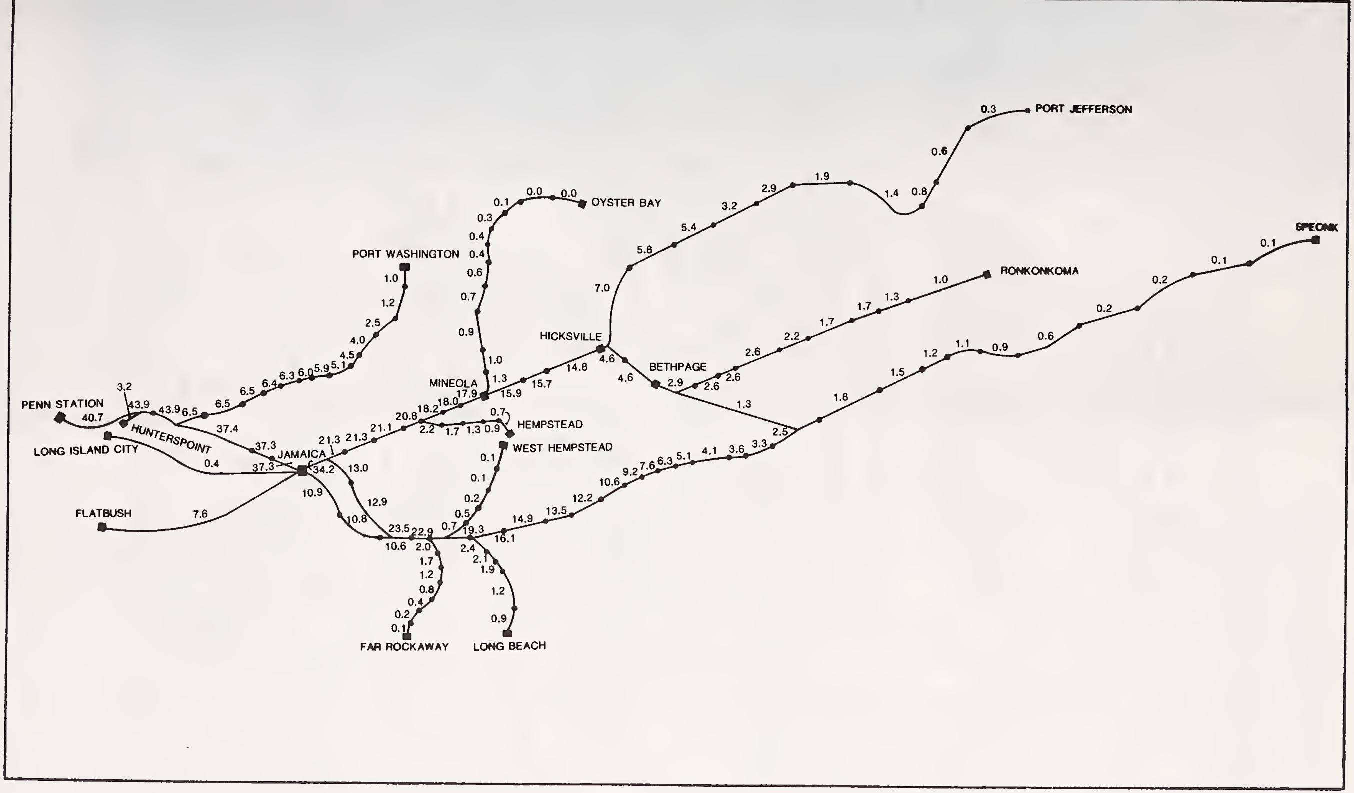
Crossing (Routes)	Trips
Queens	
60th (N,RR)	38.2
53rd (E,F)	55.6
42nd (7)	33.4
Total	127.2
Brooklyn-North	
14th (LL)	11.2
Williamsburg Bridge (J,M)	18.8
Total	30.0
Brooklyn-South	
Rutgers (F)	14.7
Manhattan Bridge (B,D,N,QB)	49.2
Cranberry (A,CC,JFK)	31.0
Clark (2,3)	17.9
Montague (M,RR)	26.7
Joralemon (4,5)	24.7
Total	164.2
TOTAL	321.4

TABLE 3-7

1980 LIRR RIDERSHIP BY TERMINAL AND DISTINATION
INBOUND AM PEAK HOUR
(THOUSANDS)

	Destination		
Terminal	Manhattan	Other	Total
Penn Station		40.7	0.0
Hunterspoint Avenue	2.8	0.4	3.2
Long Island City*	0.0	0.4	0.4
Flatbush Avenue	6.7	0.9	7.6
TOTAL	50.2	1.7	51.9

* For purposes of the current analysis, it has been assumed that all trips to Long Island City are destined for non-Manhattan destinations.



1980 LIRR STATION AND LINK VOLUMES INBOUND A.M. PEAK HOUR (THOUSANDS)

Figure 3-3

eastern terminals of all branches. Approximately 45,000 riders are observed approaching Jamaica. The major portion of these riders continue their trip via the Main Line to Penn Station. Only 7,600 inbound peak hour riders travel to the Flatbush Avenue terminal which provides access to NYCTA subway lines serving downtown Manhattan. In terms of travel volumes, the next most important terminal is Hunterspoint Avenue with 3,200 peak hour commuters. Reflecting the limited amount of revenue service, only 400 trips are made to Long Island City.

As shown in Table 3-7, the overwhelming majority of inbound peak hour riders are destined for locations in Manhattan. Most LIRR riders who get off at Hunters Point and Flatbush complete their trip by riding NYCTA subway trains to Manhattan. For purposes of the current analysis, it has been assumed that all Long Island City passengers are destined for non-Manhattan locations.

3.3.3 Arterials and Local Streets - Local Impact Areas

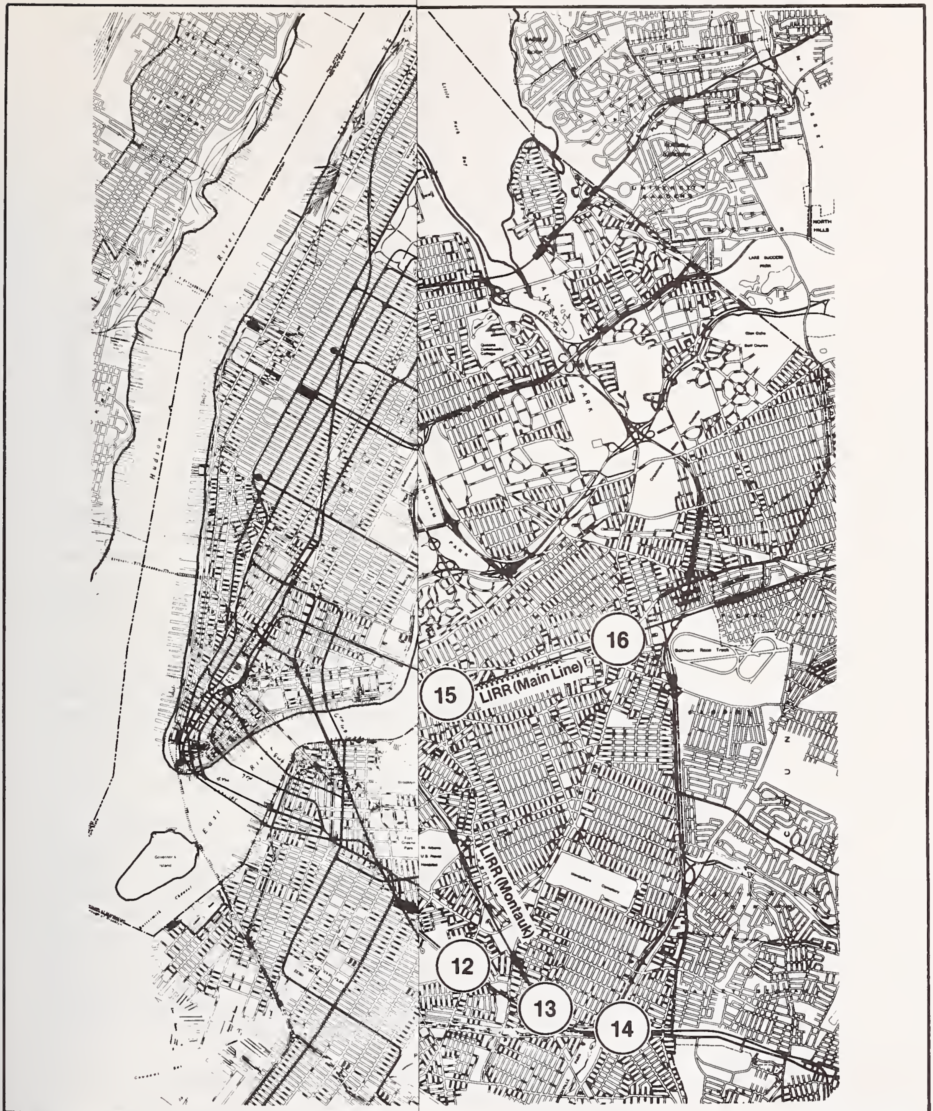
Within the project study corridor (see Section 3.2 above), the arterial and local street segments most likely to be affected by alternative subway plans are those in the vicinity of new or modified subway stations or where grade crossing eliminations are proposed. For each subway option, descriptions of existing surface traffic conditions in the critical areas are included in the Technical Supplement. Existing traffic volumes compiled by The New York City Department of Transportation (NYCDOT) and manual counts are used in the Supplement as required in the subsequent impact analyses.

Local traffic impact study areas for each alternative are identified in Figure 3-4. The Technical Supplement to this DEIS contains the index map and sketch maps showing the street network and traffic pattern in each of the local impact areas.

3.3.3(a) No Additional Construction

The areas most likely to be affected under this alternative are the streets in the vicinity of the proposed new stations on the Archer Avenue subway line: Jamaica Avenue/Van Wyck; Sutphin Boulevard/Archer Avenue; Parsons Boulevard/Archer Avenue, and the 21st Street/41st Avenue subway station which serves as the eastern terminus of the 63rd Street Tunnel.

Traffic conditions are light to moderate on the streets surrounding the 21st Street station, but demand for on-street parking space is high. The three Archer Avenue subway stations are currently under construction. Traffic on the arterials surrounding these stations, particularly Jamaica Avenue, Sutphin Boulevard, Parsons Boulevard and the Van Wyck Expressway is moderate to heavy during commuter peak hours. The Jamaica Avenue/Van Wyck station, located immediately in front of Jamaica Hospital, is the only station situated in a predominantly residential neighborhood. On-street parking demand is high at all locations except the Parsons Boulevard station where parking is readily available.



Legend
NO ADDITIONAL CONSTRUCTION

1 21st St./41st Ave. Subway Sta.
2 Jamaica Ave./Van Wyck Subway Sta.
3 Sutphin Blvd./Archer Ave. Subway Sta.
4 Parsons Blvd./Archer Ave. Subway Sta.

QUEENS BLVD. LOCAL CONNECTION

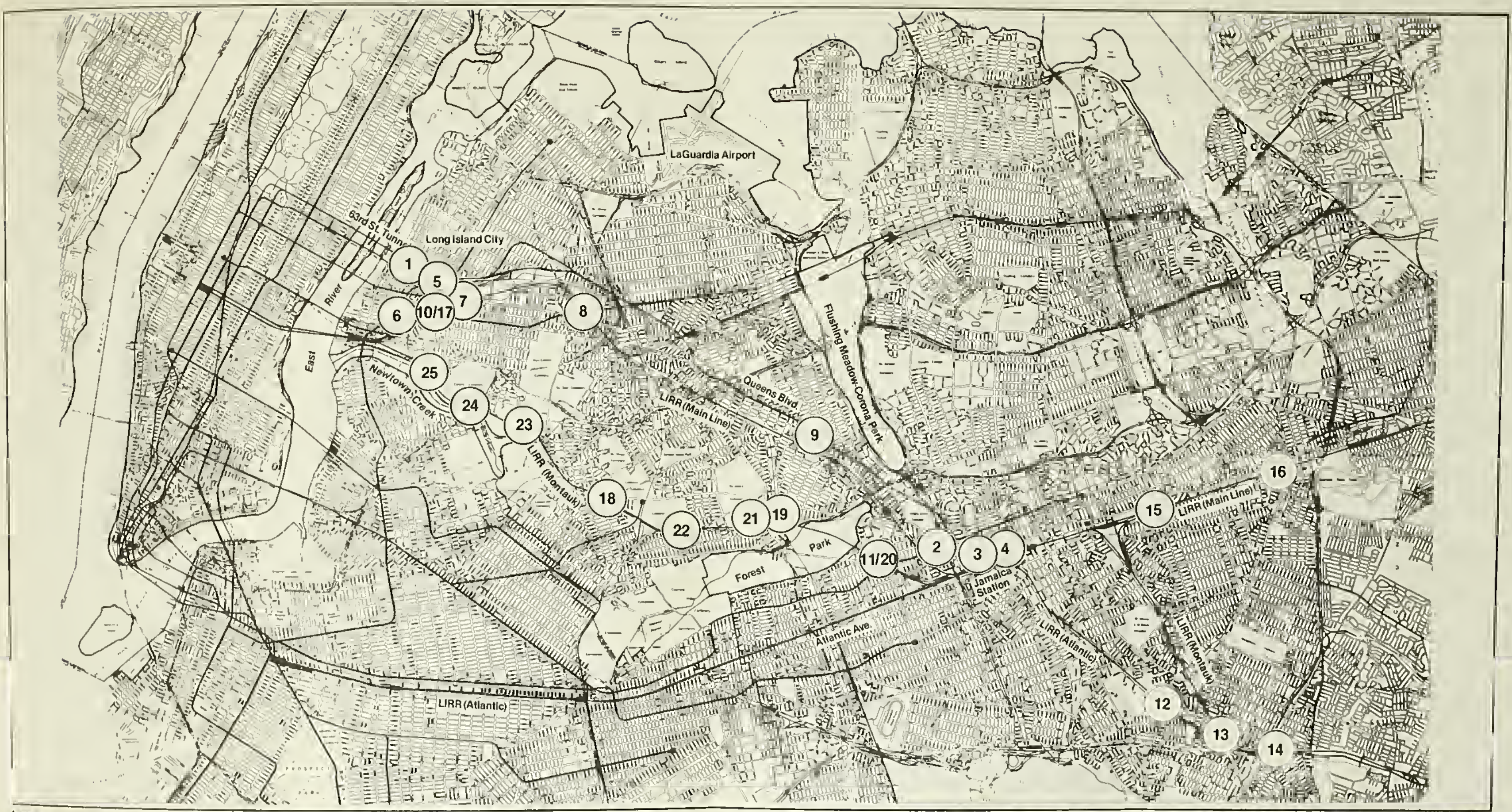
5 Additional trackage to Northern Blvd.

0 6000
Scale in Feet

N

INDEX MAP
LOCAL IMPACT AREAS
– TRAFFIC

Figure 3-4



Legend

NO ADDITIONAL CONSTRUCTION

1 21st St./41st Ave. Subway Sta.
2 Jamaica Ave./Van Wyck Subway Sta.
3 Sutphin Blvd./Archer Ave. Subway Sta.
4 Parsons Blvd./Archer Ave. Subway Sta.

QUEENS BLVD. LOCAL CONNECTION

5 Additional trackage to Northern Blvd.
6 Court Sq./23rd-Ely Pedestrian Conn.

QUEENS BYPASS EXPRESS

7 Northern Blvd./41st Ave. Subway Sta.
8 Woodside/Roosevelt Ave. Subway Sta.
9 Queens Blvd./71st-Continental Ave. Subway Sta.

SUBWAY/LIRR MONTAUK TRANSFER

10/17 Thomson Ave. Sta.
11/20 Richmond Hill Sta.
12 Locust Manor Sta.
13 Laurelton Sta.
14 Rosedale Sta.
15 Hollis Sta.
16 Queens Village Sta.

MONTAUK/ARCHER AVE. SUBWAY CONNECTION

10/17 Thomson Ave. Sta.
18 Fresh Pond Rd./Metropolitan Ave. Sta.
19 Woodhaven Blvd. Sta.
11/20 Richmond Hill Sta.
21 88th St. Grade Crossing Modification
22 73rd St. Grade Crossing Elimination
23 Maspeth Ave./49th St. Grade Crossing Modification
24 43rd St./Laurel Hill Blvd. Grade Crossing Modification
25 Greenpoint Ave. Vicinity Grade Crossing Modification

0 6000
Scale in Feet
N

INDEX MAP
LOCAL IMPACT AREAS
– TRAFFIC

Figure 3-4

The Archer Avenue subway connection also involves the removal of the Jamaica Avenue elevated tracks from approximately 126th Street to Sutphin Boulevard and the elimination of two stations at Metropolitan Avenue and Queens Boulevard. Traffic on Jamaica Avenue is moderately heavy during peak hours.

3.3.3(b) Queens Boulevard Local Connection

With this alternative, the line through the 63rd Street Tunnel would be extended along 41st Avenue and would connect under Northern Boulevard (near 39th/40th Avenues) with the Queens Boulevard line local tracks. The proposed alignment extends through the parking lot bounded by 29th Street, 40th Road and Northern Boulevard and intersects Northern Boulevard at approximately 40th Road. Construction activity would be of the cut-and-cover type and would impact surface vehicular activity in various ways throughout the construction period.

Northern Boulevard is a major Queens arterial which extends from the Queensborough Bridge in Long Island City east to Nassau County. The area is industrial in use with some residential buildings located north of Northern Boulevard. In Long Island City there are three moving lanes in each direction. During peak hours, the arterial is heavily traveled by vehicles proceeding to and from the Queensborough Bridge.

Further west on Northern Boulevard, the intersection with Queens Boulevard is the major traffic constraint in the area. Both major arterials are the main feeders to the Bridge and congestion is severe enough to warrant control by traffic agents in addition to signal control during the peak hours.

Court Square Pedestrian Connection

Connection of the 63rd Street Tunnel to the Queens Boulevard local tracks (E and F lines) would involve termination of the GG service from Brooklyn along Jackson Avenue and at the Court Square Station during peak hours. Subway riders who now transfer from GG to E/F trains at Queens Plaza would use the pedestrian connection proposed between the Court Square and 23rd Street/Ely Avenue Stations to accomplish this movement. The connection would be a free transfer, and would be approximately 360 feet long -- assuming that the necessary easement through a vacant parking lot is acquired. If the easement is not acquired, the free transfer would be provided via a longer route extending along the south side of 44th Drive.

3.3.3(c) Queens Bypass Express

The alternative proposes a new station at Northern Boulevard/41st Avenue located under Northern Boulevard, extending the 63rd Street Tunnel alignment east from the 21st Street/41st Avenue Station. Traffic on Northern and Queens Boulevards is heavily congested during the peak hours as the arterials are the main feeders to the Queensborough Bridge. A new station is also planned at Woodside Avenue, south of the existing LIRR station, where traffic is moderate and modifications are proposed to the existing 71st/Continental Avenues Station.

Construction of this alternative will affect operating conditions over an extended number of streets and arterials.

East of the proposed Northern Boulevard Station, the Queens Bypass Express alternative would extend in a tunnel beneath Sunnyside Yard and then surface to run at-grade along the LIRR Main Line right-of-way to Yellowstone Boulevard, and would be in an underground alignment to new station facilities at Queens Boulevard/Continental Avenue.

The at-grade portion extending from Honeywell Avenue to Yellowstone Boulevard would require modification to some two dozen structures which carry automobiles, transit vehicles and tracks and pedestrians.

In addition to the construction of new stations at Northern Boulevard and Woodside Avenue, the eastern limit of construction will require extensive work, including relocation of a major sewer under Yellowstone and Queens Boulevards and at the southern portion of the 71st/Continental Avenues Station of the IND.

During construction, temporary detours/closings, etc., will be required at various locations. Traffic in the vicinity of the existing 71st/Continental Avenues Station is heavy. Peak hour congestion extends throughout the area arterials including Yellowstone Boulevard, Honeywell Avenue and particularly along Queens Boulevard.

3.3.3(d) <u>Subway/LIRR Montauk Transfer</u>

Modifications to existing LIRR stations are proposed under the Montauk Transfer alternative at Richmond Hill, Locust Manor, Laurelton, Rosedale, Queens Village and Hollis. The stations are located in primarily residential neighborhoods where traffic flow is moderate. Several intersections, however, have larger volumes of traffic and may be impacted adversely under this alternative. Congestion occurs during peak hours at the intersections of Springfield Boulevard and Jamaica Avenue in Queens Village and Farmers Boulevard and Hollis Avenue in Hollis.

Under this alternative, a proposed station at Thomson Avenue would function as a western terminus for the LIRR and a terminus for the extended subway line from the 63rd Street Tunnel. The station site is located in an area of light traffic in the western portion of Sunnyside Yard.

<u>At-Grade Crossing Modifications</u>

Under the Montauk Transfer and the Montauk/Archer alternatives, locations where streets cross the existing LIRR Montauk Line at-grade would require modification. Between the Thomson Avenue and Richmond Hill stations there are seven existing crossings that require modification. Six of these crossings will be served at four new grade separated locations; one crossing will not be served under current proposals.

Traffic currently using the existing grade crossings is moderate to light at all locations. Details of reroutings and detours are included in the Technical Supplement.

3.3.3(e) Montauk/Archer Avenue Subway Connection

In addition to grade crossing eliminations discussed under the Montauk Transfer, the Montauk/Archer alternative requires a new station at Thomson Avenue functioning solely as a subway station. The location is the same as discussed in the previous alternative for a Thomson Avenue Transfer Station. New stations are proposed at Fresh Pond Road/Metropolitan Avenue, and Woodhaven Boulevard. Woodhaven Boulevard is a major Queens arterial where congestion is heavy during the peak hours. The alternative includes provision of bus pick-up and drop-off areas on the Woodhaven Boulevard viaduct where traffic impacts could be substantial. Congestion in the vicinity of the proposed Fresh Pond Road/Metropolitan Avenue Station is moderate and on-street parking demand is high.

The Montauk/Archer alternative calls for modifications to the Richmond Hill LIRR Station. Congestion on the streets surrounding the station, particularly Jamaica Avenue and Lefferts Boulevard, is moderately heavy.

3.3.4 Transit Improvement Plan

The MTA has an existing program (1982-86) of Transportation Improvements for the New York City Transit Authority. These improvements are primarily directed at bringing the system to a state of good repair, and being able to maintain it. On a systemwide basis, this is resulting in the modernization and rehabilitation of track, signals and structures. In addition, systemwide modernization of power substations, ventilation and passenger amenities are being undertaken.

The Queens Boulevard line is one of the newest subway lines of the Transit Authority, having been completed approximately forty years ago. There are no current plans for major structural, signal or track replacements. In the case of track, however, there is a systemwide on-going program identifying and correcting individual track sections that are deficient, commonly referred to as "Red Tagged". To the extent that inspections reveal any such locations on the Queens Boulevard line, repairs would be initiated.

Projects currently planned for the line include two passenger stations to receive minor improvements, a modernization of an existing ventilation facility at the 53rd Street Tunnel and some new welded track. In addition, two projects are planned involving the Jamaica Yard and Barn facility which are connected to the Queens Boulevard line. This facility provides storage, light maintenance, and inspection for subway cars operated on the Queens Boulevard line and in both Manhattan and Brooklyn. The current plans call for expansion of the yard to store the existing car fleet and a modernization of the existing maintenance barn.

These improvements represent a small portion of the existing approved five year MTA Capital Program (TA portion is approximately $6.5 billion) for the period 1982-1986.

3.3.5 Freight Operations

3.3.5(a) Description of Rail Right-of-Way

Two sections of LIRR track are important components of the Montauk Transfer and the Montauk/Archer alternatives. They are the 7.5 mile two-track Montauk Branch from Jamaica to Bliss Interlocking in Long Island City and the 1.5 mile two-track Montauk Cutoff from Bliss to the Sunnyside Yard Complex in Long Island City. Both sections are non-electrified and used lightly.

The Montauk Branch is the LIRR's only freight conduit from the mainland. Each day, Conrail trains bring approximately 80 freight cars across the Hell's Gate Bridge to Fresh Pond Junction, where the Conrail line crosses the Montauk Branch. LIRR crews move the cars from interchange tracks at Fresh Pond to a classification yard in Long Island City via the Montauk Branch. In addition to serving as the railroad's through route for freight, the Montauk Branch between Fresh Pond and Long Island City is surrounded by industries which receive rail freight deliveries on private sidings or public team tracks.

3.3.5(b) Existing Train Movements

At present, passenger service on the Montauk Branch is limited to three weekday diesel revenue trains that originate or terminate at Oyster Bay in Nassau County. In addition, nine diesel locomotives return east to Morris Park, Jamaica for servicing after laying up their Main Line morning passenger trains at the Long Island City coach yard. Morning occupancy of the line by the deadheading diesels lasts from approximately 7:50 AM to 10:05 AM. In the evening, the engines return to Long Island City, utilizing the Montauk Branch from 3:15 PM until nearly 5:30 PM.

While most of the Long Island's diesel-hauled passenger cars remain in the Long Island City coach yard during the day, some cars are deadheaded to Jamaica via the Montauk Branch for use in midday service. Twenty-five diesel cars from four morning westbound trains are sent to Jamaica between 7:09 and 9:27 AM. In the evening, six equipment trains travel from Jamaica to Long Island City between 2:00 and 4:51 PM.

The remaining activity on the line consists of through freight trains, hauling some 19,000 annual carloads from the Conrail interchange at Fresh Pond Junction, and local freight trains, delivering 5,600 annual carloads to industries located on the Montauk Branch. As of early 1984, the LIRR operates ten freight trains daily, Monday through Friday on the Montauk Branch.

The Montauk Branch and Montauk Cutoff contain 102 usable car receiving tracks, grouped around 31 separate points of entry to the two main Montauk Branch tracks. Eight of the 31 sidings are inactive; the remaining 23 received annual volumes between three and 3,037 carloads in 1982. Figure A.10-1 in the Appendix shows schematically the Montauk Branch, Montauk Cutoff and their associated freight sidings. To serve these sidings, two local freight train round trips operate on the Montauk Branch each weekday.

The Fresh Pond Local departs Yard A at 10:00 AM to serve the Bushwick Branch and the Montauk Branch serving Fresh Pond, Glendale and Richmond Hill. It returns to Yard A at approximately 3:00 PM.

The Long Island City Local departs Yard A at 7:00 PM to serve the Yard A Sidings, Montauk Cutoff and the Montauk Branch west of Milepost Four. It returns to Yard A at about 1:00 AM.

3.3.5(c) Projected Train Movements

Because of the deregulation of railroad rate-setting, the 1982-1983 recession and the gradual erosion of business activity at Long Island City, carloads on the Montauk Branch have declined dramatically in recent years. The 1981 enactment of the Staggers Act allowed Conrail, the Long Island's only connecting railroad, to cancel joint rates. Joint rates are all inclusive rates for moving goods from origin to destination, via several railroads. Without joint rates, shippers must negotiate charges with each railroad involved in the shipment. As a result, virtually all of the Long Island's outbound freight shippers switched to trucks, and some inbound rail freight receivers found it more economical to transload from Conrail rail cars to trucks in New Jersey.

Annual local delivery carloads on the Montauk Branch have dropped nearly 50 percent since 1980; 13,526 cars were handled in that year, 12,464 in 1981 and 8,725 in 1982.

The LIRR, in a 1983 estimate of freight service operating expenses through 1992, projected continued declines in system carload volumes. Carloads handled in 1992 are expected to total 39 percent of the present 1983 carloads handled.

A dramatic decrease or a moderate increase in freight carloads handled by the LIRR would not affect the existing schedule of ten daily freight trains. An optimisticly high level of freight carload volumes and the 1984 freight train schedule are used in the assessment of the environmental impacts of rail freight operations. The 1980 carload volumes were 55 percent higher than those at present (1983).

3.3.5(d) Importance of the Rail Operation to the Railroad and its Customers

For many freight receivers, the United States railroad system serves as the most economical method of moving raw materials to their manufacturing or distribution site on Long Island. This is particularly true for bulk commodities, such as gravel, salt, flour and coal. The Montauk Branch in Queens serves as an essential link in the rail route from the mainland to Brooklyn, Queens, Nassau and Suffolk Counties.

It is important to retain the freight carrying capability of the Montauk Branch as a "safety-valve" in the event of unforeseen freight distribution crises in the New York metropolitan area. For example, a long-term natural gas or fuel oil shortage would create a large demand for coal, a fuel most economically moved by rail. The imposition of more stringent truck weight limitations on Hudson or East River Bridges could also create increased demand for LIRR freight services.

3.4 Community Resources - Study Corridors

A detailed, written description of existing land use and zoning within 1,000 feet on both sides of the alternative alignments was provided in Working Paper No. 15: Baseline Report. That information is presented graphically in the Technical Supplement to the DEIS. Potentially impacted public and private schools -- those immediately adjacent to or within a few blocks of surface alignments where construction will be necessary or where the number of passing trains on existing tracks will increase -- are listed in Tables 3-8 and 3-9 and mapped on Figures 3-5 and 3-6.

3.5 Community District Profiles-Socioeconomic Resources

For each community district through which the various alternatives run, descriptions of historic development, community character, economic activity and demographic trends were gathered and compiled in Working Paper No. 15: Baseline Report. Relevant sections of that report are summarized in the section below. The community districts are shown on Figure 3-7. Detailed demographic characteristics by community districts are presented in the Technical Supplement to the DEIS.

3.5.1 Community District 1

Community District 1 is primarily a residential district consisting of one and two-story attached and detached homes as well as medium-rise, three-to-six story apartment buildings. The Astoria section of CD 1 is well known for a large Greek population and the area is infused with Greek language and culture. The district contains some industrial uses north of Queens Plaza, the Queensboro Bridge and along the Brooklyn Queens Expressway, the Astoria Picture Studios, a major and growing center for motion picture production. The district is also known for Steinway Street,

TABLE 3-8

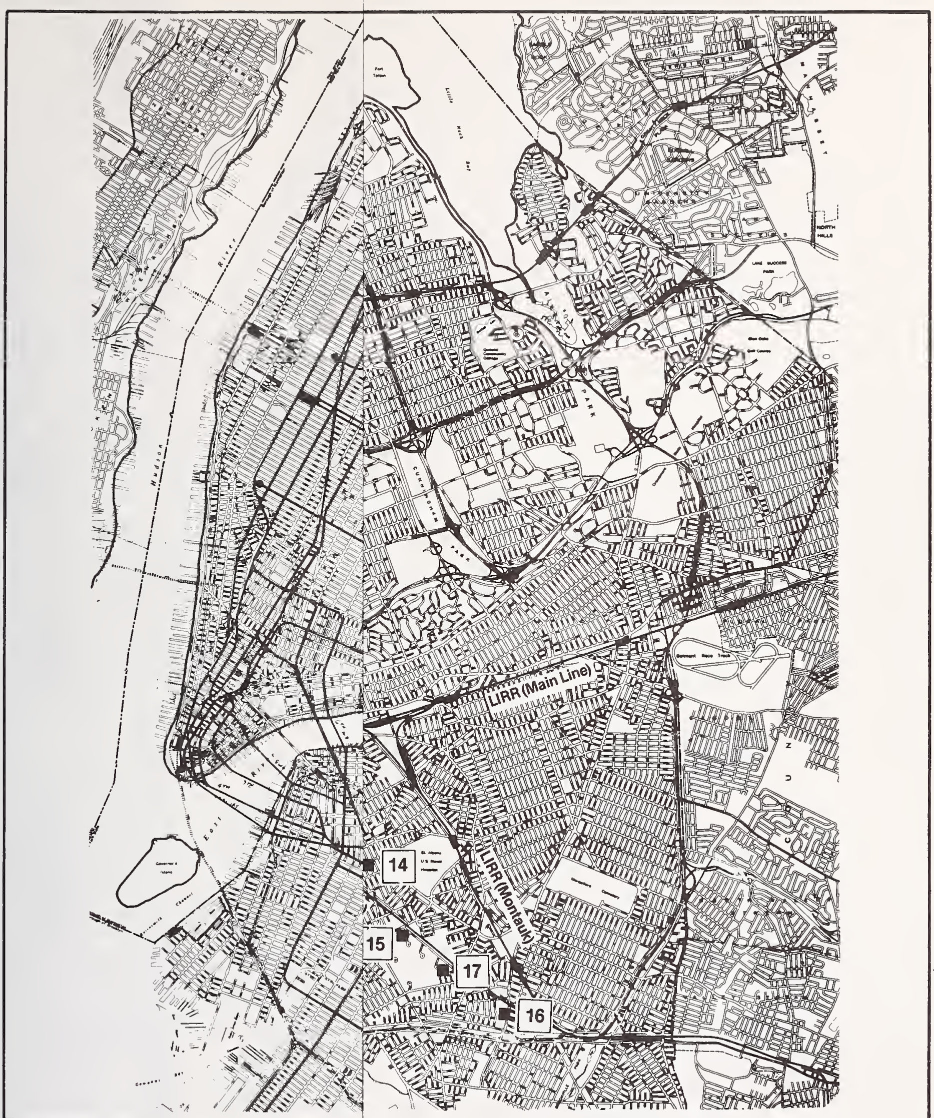
Public Schools in the Impact Study Area

Map #	School Name	Address	School Board	Community District
1	Long Island City H.S.	28-01 41st Avenue, LIC	78	1
2	P.S. 102	55-24 Van Horn St., Elmhurst	24	4
3	P.S. 153	60-02 60th Lane, Maspeth	24	5
4	P.S. 71	62-85 Forest Ave., Ridgewood	24	5
5	P.S. 91	Central Ave. & 69th St., Glendale	24	5
6	I.S. 119	78th Ave. & 74th St., Glendale	24	5
7	P.S. 113	87-21 79th Ave., Glendale	24	5
8	P.S. 139	93-06 63 Drive, Rego Park	28	6
9	I.S. 190	68-17 Austin St., Forest Hills	28	6
10	P.S. 51	87-50 118th St., Richmond Hill	27	9
11	P.S. 55	131-10 97th Ave., Richmond Hill	28	9
12	P.S. 48	155-02 108th Ave., Jamaica	28	12
13	P.S. 40	109-20 Union Hall St., Jamaica	28	12
14	P.S. 140	116th Ave. & 166th St., Jamaica	28	12
15	P.S. 30	126-10 Bedell St., Jamaica	28	12
16	Springfield Gardens H.S.	143-10 Springfield Blvd Spring Gdns	78	12
17	P.S. 80	137th Ave. & E 173rd St., Jamaica	28	12

TABLE 3-9

Non-Public Schools in the Impact Study Area

Map #	School Name	Address	Affiliation	Community District
1	St. Patrick School	39-37 28th St. LIC	Rom.Cath.	1
2	St. Sebastian School	39-76 58th St., Woodside	Rom.Cath.	2
3	St. Mary's Help of Christian School	70-20 47th Ave., Woodside	Rom.Cath.	2
4	St. Adalbert School	52-17 83rd St., Elmhurst	Rom.Cath.	4
5	Holy Cross School	61st St. & 56th Ave., Maspeth	Rom.Cath.	5
6	Our Lady of the Miraculous Medal School	61st St & Bleecker St., Ridgewood	Rom.Cath.	5
7	Christ the King H.S.	68-02 Metropolitan, Middle Village	Rom.Cath.	5
8	Sacred Heart (Glendale)	84-05 78th Ave., Glendale	Rom.Cath.	5
9	Resurrection-Ascension Sch	85-25 61st Rd, Rego Park	Rom.Cath.	5
10	Summit School	71-11 112th St., Forest Hill	-	6
11	Forest Hill Montessori Sch	104-40 Queens Blvd., Forest Hill	-	6
12	Delehanty H.S.	91-01 Merrick Blvd., Jamaica	-	12
13	Academy St. Peter Claver	149-18 Jamaica Ave., Jamaica	Episcopal	12
14	St. Joseph (Jamaica) Sch.	108-43 Sutphin Blvd., Jamaica	Rom.Cath.	12
15	St. Gerard Majella Sch.	91st Ave. & 188th St., Hollis	Rom.Cath.	12
16	Woodhill Day School	196-10 Woodhill Ave., Hollis	Episcopal	12
17	St. Clare School	137-25 Brookville, Rosedale	Rom.Cath.	13
18	St. Joseph's Parrish Day	99-10 217th Lane, Queens Village	Episcopal	13



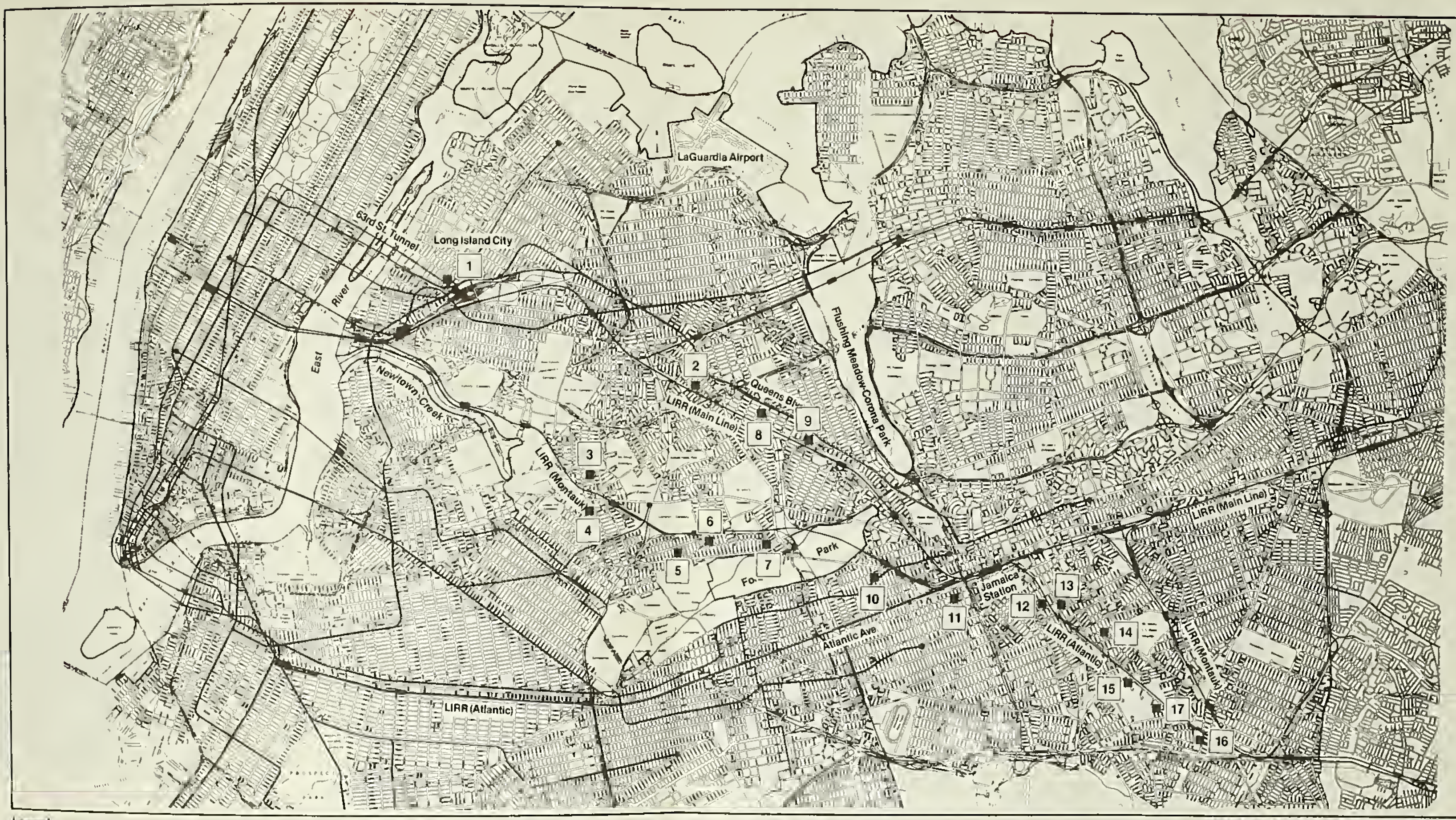
Legend

1 Long Island City H.S.
2 P.S. 102
3 P.S. 153
4 P.S. 71
5 P.S. 91

0 6000
Scale in Feet
N

PUBLIC SCHOOLS

Figure 3-5

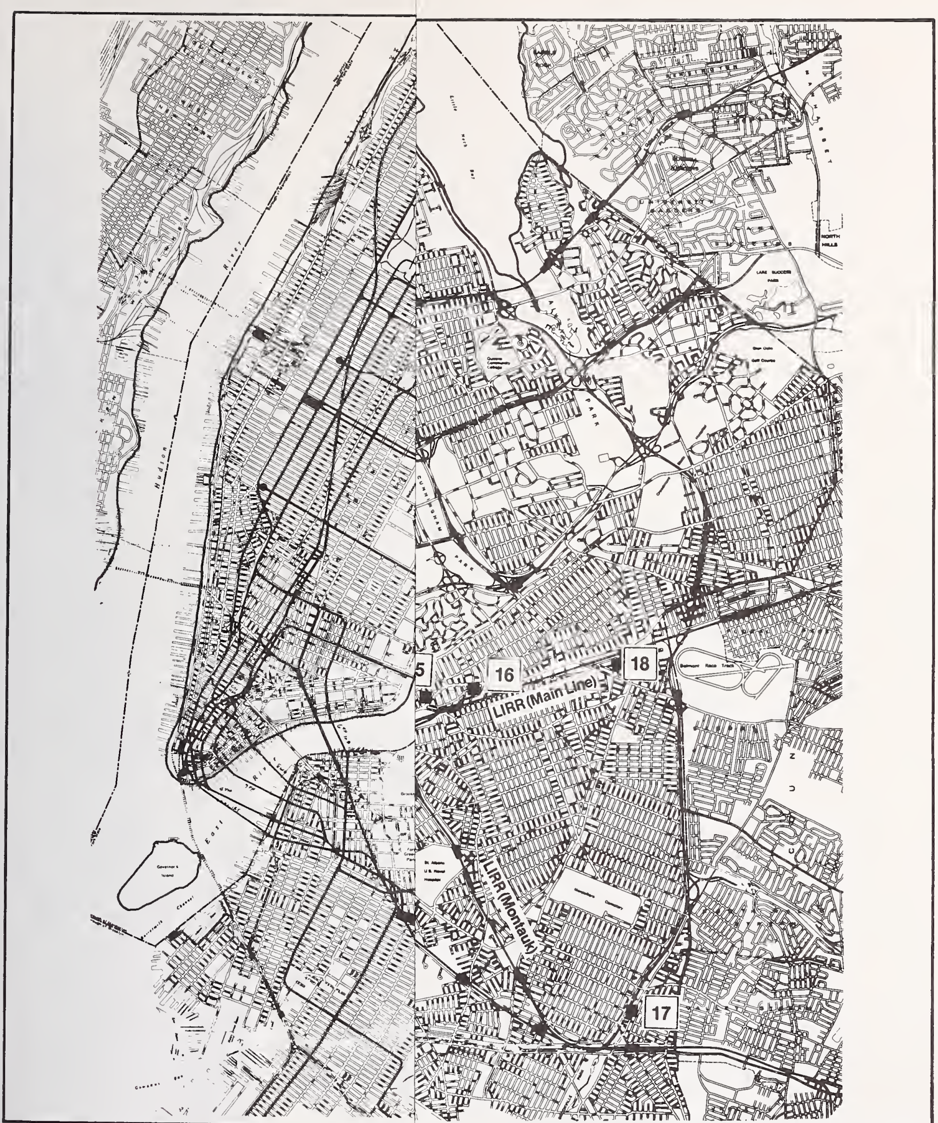


PUBLIC SCHOOLS Figure 3-5

Legend

1	Long Island City H.S.	6	I.S. 119	12	P.S. 48
2	P.S. 102	7	P.S. 113	13	P.S. 40
3	P.S. 153	8	P.S. 139	14	P.S. 140
4	P.S. 71	9	I.S. 190	15	P.S. 30
5	P.S. 91	10	P.S. 51	16	Springfield Gardens H.S.
		11	P.S. 55	17	P.S. 80

0 6000
Scale in Feet
N



Legend

1 St. Patrick School

2 St. Sebastian School

3 St. Mary's Help of Christians School

4 St. Adalbert School

0 6000

Scale in Feet

N

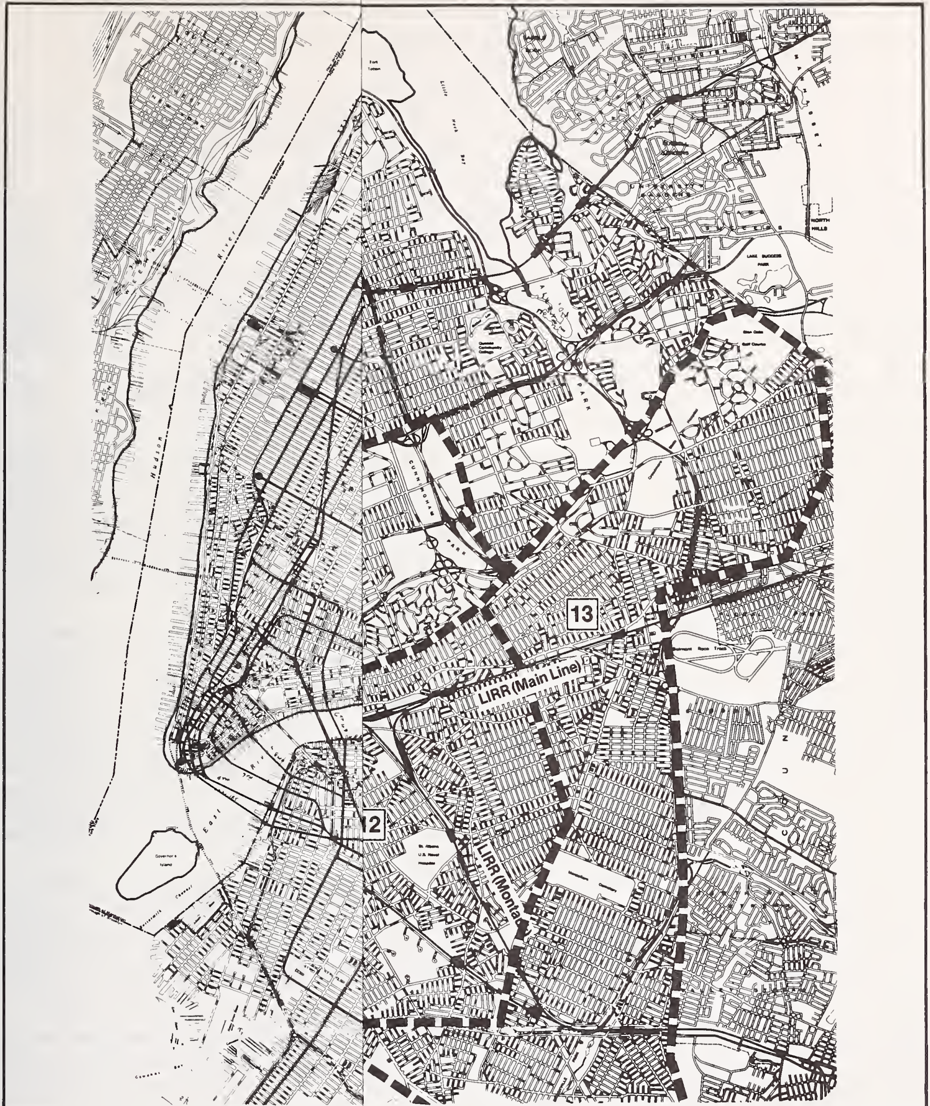
NON-PUBLIC SCHOOLS Figure 3-6

NON-PUBLIC SCHOOLS Figure 3-6

Legend

1 St. Patrick School
2 St. Sebastian School
3 St. Mary's Help of Christians School
4 St. Adalbert School
5 Holy Cross School
6 Our Lady of the Miraculous Medal School
7 Christ the King H.S.
8 Sacred Heart (Glendale)
9 Resurrection-Ascension School
10 Summit School
11 Forest Hills Montessori School
12 Delehanty H.S.
13 Academy St. Peter Claves
14 St. Joseph (Jamaica) School
15 St. Gerard Majella School
16 Woodhull Day School
17 St. Clare School
18 St. Joseph's Parish Day School

0 6000
Scale in Feet
N



Legend

Community District Boundary

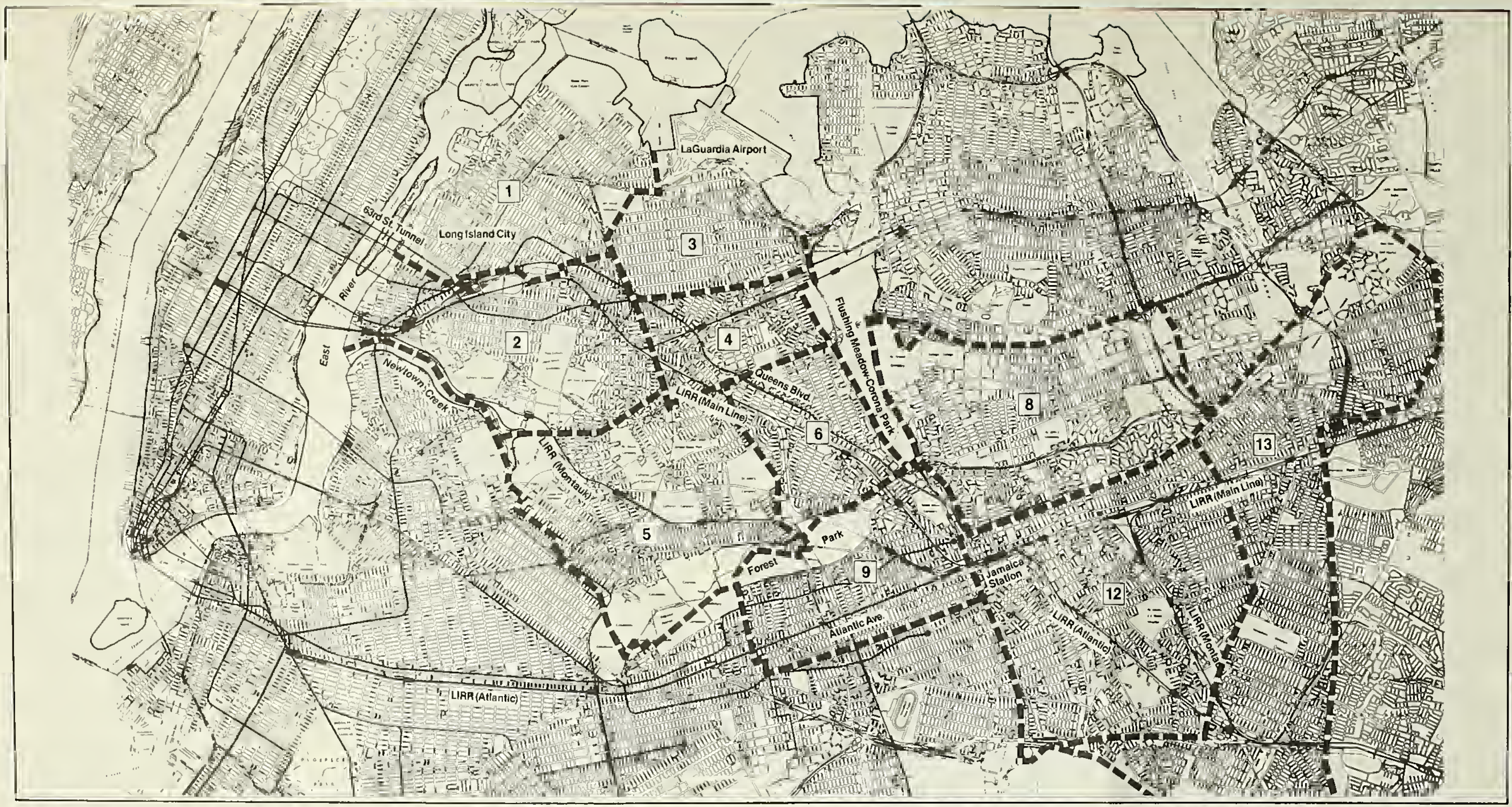
0 6000

Scale in Feet

N

COMMUNITY DISTRICT STUDY AREA

Figure 3-7



Legend

Community District Boundary

0 6000
Scale in Feet

N

COMMUNITY DISTRICT STUDY AREA

Figure 3-7

one of the major retail shopping areas in Queens. The waterfront is dominated by the Con Edison Ravenswood Power Plant.

The Community District is served by the Astoria line subway (RR) which runs along 31st Street and the Queens Boulevard line (E, F, N and GG) which runs along Northern Boulevard, Steinway Street and Broadway.

Based on median household income, concentration of minorities, and people under 18 or 65 years of age or older, CD 1 appears to have one of the largest transit dependent populations of any community district in the borough.

3.5.2 Community District 2

Community District 2 consists of the communities of Long Island City, Woodside and Sunnyside. Long Island City is primarily an industrial district with a mix of heavy and light manufacturing, wholesale distribution, warehousing and transportation-related businesses. There are some scattered clusters of residential uses as well. In recent years, the area has also become attractive to artists, office tenants and firms engaged in various aspects of the motion picture industry, though its basic industrial character remains dominant.

Woodside and Sunnyside are both mixed-use residential/industrial areas. Woodside is a stable working class neighborhood, dominated by one- and two-family, semi-attached homes and a scattering of apartment complexes and industrial uses. There is a strong neighborhood shopping area along Roosevelt Avenue. Although a stronghold of Irish-Americans, the past decade has witnessed an influx of persons of Hispanic and Asian origin. Sunnyside is a mixed residential/industrial area dominated by mid- and low-rise apartment buildings, including Sunnyside Gardens, with industrial uses concentrated along Newtown Creek and adjacent to the Sunnyside Yards. The major neighborhood shopping area is along Greenpoint Avenue and Queens Boulevard.

Major development interest in the district has focused on the waterfront in the Hunters Point section. The Port Authority of New York and New Jersey is currently exploring plans for a large scale development on a 70-acre site along the waterfront. Market studies and the preparation of a Master Plan are presently being conducted.

Transit service is provided by the Flushing line (7) which runs above Queens Boulevard and Roosevelt Avenue. The Brooklyn Queens crosstown (GG) has stops in Long Island City, and some Long Island Rail Road trains stop at the Woodside Station.

An influx of people of Hispanic and Asian origin and a low median household income substantially below the borough average indicates the presence of a large transit dependent population.

3.5.3 Community Districts 3 and 4

The major neighborhoods in CD 3 and CD 4 are Jackson Heights, Corona and Elmhurst. All three neighborhoods are predominantly residential in character. Jackson Heights contains a mix of single and multi-family row housing and medium sized apartment buildings. The housing stock in Corona is primarily single and two family row housing. Elmhurst also contains a mix of single family homes and apartment buildings, including the large Lefrak City complex. All three areas have witnessed a tremendous influx of foreign immigrants over the past decade, principally Hispanic in Jackson Heights and Corona, and Oriental in Elmhurst. Major economic activity is concentrated near LaGuardia Airport in CD 3 and along Queens Boulevard in CD 4 where Macy's and the Queens Center Shopping areas are located. Several large office buildings are located on Queens Boulevard near Lefrak City. Major neighborhood shopping areas include Junction Boulevard, Roosevelt Avenue, 82nd Street and Northern Boulevard.

The two districts are served by the Flushing Line (7) which runs along Roosevelt Avenue and Queens Boulevard. Community District 4 has some Long Island Rail Road service via the Port Washington Branch.

Because of a sizable influx of foreign immigrants, including many school-aged children, and comparatively low median household incomes, both districts contain sizable transit dependent populations.

3.5.4 Community District 5

The major neighborhoods in CD 5 are Maspeth, Glendale, Middle Village and Ridgewood. All contain a mix of residential, industrial and commercial uses. Residential uses are primarily free standing or attached single family homes and low rise apartment buildings. The strongest concentration of industrial uses is in Maspeth, along the Newtown and Maspeth Creeks. Maspeth, in fact, is one of the City's healthiest industrial districts and major distribution centers. Industrial uses are also concentrated along the Montauk and Bushwick branches of the Long Island Rail Road. Notable uses include the 1.5 million square foot Macy's distribution center situated on a 25 acre site on Metropolitan Avenue (near the Lutheran Cemetery) and includes a Times Square Store and Waldbaums. The United Parcel Service distribution center and the industrial complexes formerly occupied by Cerro Wire and Cable and Phelps Dodge Industries are also located within this district. Major neighborhood shopping areas in the district include Myrtle Avenue, Fresh Pond Road, Metropolitan Avenue and Woodhaven Boulevard.

Transit access for these communities is limited; the district is served by the Canarsie Line (LL) and the Myrtle Avenue Line (M). The Montauk Branch of the Long Island Rail Road is used primarily for freight operations and very limited commuter service.

Community District 5 is the most racially homogenous district in the borough with a white population of over 90 percent. With a median household income below the borough wide figures and a large and growing elderly population, there is a sizable transit dependent population in the district.

3.5.5 Community District 6

Community District 6, comprising the communities of Forest Hills and Rego Park, is one of the more affluent districts in Queens. Particularly well known for Forest Hills Garden, one of the most attractive and desirable residential developments in New York City, the district contains a mix of single family homes, garden apartment complexes, and one of the largest concentrations of luxury high rise apartment buildings in the borough. Co-op conversion of the area's existing residential stock has been a prevalent trend over the past decade.

Major economic activity in the area is concentrated along or just off Queens Boulevard, including several office buildings and the Alexander's Department Store, which together with the Queen's Center and Macy's (in CD 4) form the economic hub of the borough. Austin Street, in Forest Hills is another major commercial shopping street. At the current time, plans are being formulated to develop a shopping mall on the Alexander's parking lot which would include a Sears Roebuck store and numerous small shops integrated with the existing Alexander's.

Transit service is provided by subway trains of the Queens Boulevard line and some Long Island Rail Road trains stopping at the Forest Hills Station.

Despite the fact that CD 6 is a higher income district, a large and growing elderly population indicates a potentially substantial transit dependent population.

3.5.6 Community District 8

The communities in CD 8 which could be potentially impacted by the new transit service are Jamaica Hills, Jamaica Estates, and Briarwood. These areas are overwhelmingly residential in character. Jamaica Estates and Jamaica Hills are suburban in character with large single family and two family homes. The housing stock in Briarwood contains a mix of single and two family homes and small apartment buildings. There is little economic activity outside of neighborhood service centers. The exception is the Fresh Meadows Shopping Center containing Bloomingdale's and Filene's.

Transit service is provided by trains of the Queens Boulevard line which runs along Hillside Avenue.

The median household income in Community District 8 is substantially above the borough-wide figures indicating a smaller transit dependent population than in other districts. There are still, however, large numbers of people in the two prime transit dependent age groups.

3.5.7 Community District 9

Within CD 9 are the communities of Woodhaven, Richmond Hill, and Kew Gardens. They are all primarily residential districts. Woodhaven is characterized by brick or frame rowhouses and Richmond Hill by large frame houses and attached brick homes and small apartment buildings. Kew Gardens is characterized by a mix of one and two family homes and medium and large sized apartment buildings. Dominant features of the area include the Elevated BMT line running along Jamaica Avenue in Richmond Hill and Woodhaven, and the vast government complex including Borough Hall, the Supreme Court and the Queens House of Detention on Queens Boulevard near Union Turnpike.

There is a scattering of industrial uses, primarily along the Montauk Branch of the LIRR and major commercial/shopping uses along Jamaica Avenue and Queens Boulevard. At the present time, Pathmark is constructing a major new neighborhood shopping center on the site of the former Lalanie and Grosjean Manufacturing Company at Atlantic Avenue and 92nd Street.

Transit service is provided by the Queens Boulevard line and by the BMT line (J) along Jamaica Avenue. Some Long Island Rail Road service is provided at the Kew Gardens Station.

Transit dependency in the district appears to be less than throughout other districts in Queens, although as with other districts, a sizable element of the community is likely to be transit dependent.

3.5.8 Community District 12

Community District 12 is unlike any other in the borough. It is the only district with a clearly defined central business district and it is the only district in Queens with neighborhoods exhibiting substantial signs of decay.

Downtown Jamaica is a major transportation hub, providing Long Island Rail Road connecting and transfer services, bus terminal facilities and the terminus of the Independent E and F lines (Queens Boulevard trains) and the Jamaica Line (J). It was also the traditional downtown for the borough of Queens. Over the past decade that role has waned with the closing of Gertz and Macy's and the shift of commercial interest in the borough to Rego Park and Long Island City. Revitalization plans, coordinated by the Greater Jamaica Development Corporation, are seeking to reverse the district's decline. The completion of the campus for York College, the construction of a major office building to house functions of the Social Security Administration (with approximately 3,000 employees), the conversion of the Gertz Building to office space which will be home to some State offices relocating from the World Trade Center, and the demolition of the Jamaica El, all have the potential to contribute to improving conditions in downtown Jamaica.

Jamaica and South Jamaica are two of the more problem plagued neighborhoods in the borough with a large concentration of substandard single and multi-family housing. Other communities in CD 12 include: St. Albans and part of Springfield Garden, two stable upper-middle and middle income neighborhoods whose predominant housing stock consists of well maintained, large single family homes; Hollis, a residential community with a mixture of single family homes and apartment buildings; Rochdale Village, a complex of twenty 14-story apartment buildings built on the site of the former Jamaica Race track; and Baisley Pond Park, a community of single family homes.

Other than downtown Jamaica, economic activity consists of industrial uses, primarily adjacent to the rail line, the growth of Air Cargo facilities to service J.F.K. Airport, and neighborhood shopping areas such as Linden Boulevard, Hollis Avenue and Sutphin Boulevard.

CD 12 is the only district in the borough with a black majority. The large concentration of minorities, the low median household income -- particularly in Jamaica and South Jamaica -- and a large concentration of persons under 18 or 65 and over, comprise the largest transit dependent population of any district in the borough.

3.5.9 Community District 13

Within the study area in CD 13 are the communities of Bellerose, Cambria Heights, Laurelton, Queens Village, Rosedale and Springfield Gardens. The district is perhaps the most suburban in character of any in the borough with single family and two family homes and garden apartment complexes being the predominant components of the housing stock. It is also the least served area in the borough in terms of transit facilities, relying exclusively on limited service provided by the Far Rockaway and Hempstead Branches of the Long Island Rail Road. Economic activity in the district is influenced primarily by the presence of Kennedy Airport, where pressures for air cargo facilities are spreading into the Springfield Gardens area. Neighborhood commercial areas have fared relatively poorly, primarily because of proximity to Nassau County.

CD 13 is one of the most racially mixed districts and in terms of median household income, it is the most affluent district in the borough. Combined with declines of both school-aged and elderly population, the population in this district is probably the least transit-dependent of any district in the borough.

3.6 Air Quality

In recent years air quality and the intensive programs now underway to improve this component of the environment have been the subjects of much discussion and controversy. As part of the Queens Subway Options Study a comprehensive air quality study was undertaken to determine the environmental impacts of the various alternatives on this component of the environment. Both mesoscale and microscale air quality effects were considered.

3.6.1 Relevant Pollutants, Standards and Criteria

Mesoscale or areawide burden analysis is appropriate when it is determined that significant changes in auto and bus vehicle miles traveled or major diversions of traffic from one route to another will occur.

Microscale effects are site-specific effects and are evaluated by determining local pollutant concentrations. Microscale effects are caused by localized shifts in vehicular travel and route changes. Microscale effects are examined by computing changes in concentration at specific locations -- such as locations adjacent to major stations and along feeder streets.

Travel demand analysis for the Queens transit improvement study indicated a basically constant trip-table total of transit ridership under each of the project alternatives including the No Additional Contruction option. The alternative proposals would divert riders from one rail transit line to another to achieve the project goals of relief of subway overcrowding and improved service and accessibility to the system. The alternatives being considered would not result in modal shifts or major route diversions. Given that anticipated changes in vehicular traffic patterns are localized, a microscale analysis was performed to evaluate carbon monoxide impacts.

3.6.1(a) National and State Ambient Air Quality Standards

As required by the Clean Air Act Ammendments of 1970, National Ambient Air Quality Standards (NAAQS) have been established for seven major air pollutants: carbon monoxide, hydrocarbons, nitrogen oxides, photochemical oxidants, total suspended particulate matter, sulfur oxides, and lead. These standards, summarized in Table 3-10, have also been established as the official ambient air quality standards for the State of New York. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare.

In order to compare estimated carbon monoxide concentrations against the national and state ambient air quality standards for carbon monoxide (which are based on one-hour and eight-hour averages of carbon monoxide concentrations), estimates of maximum concentrations for these same time periods must be prepared.

3.6.1(b) De Minimus Criteria for Carbon Monoxide

In addition to the NAAQS, de minimus criteria are applied to estimate impacts on air quality from incremental changes. These set the change in carbon monoxide concentration that defines a significant environmental impact. Thus, the New York City Department of Environmental Protection defines significant impacts as: (1) an increase of more than half the difference between baseline concentrations and the standards, when concentrations are below the standards, and (2) the New York State Department of

TABLE 3-10

NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	PRIMARY			SECONDARY		
	PPM	Milligrams Per Cubic Meter	Micrograms Per Cubic Meter	PPM	Milligrams Per cubic Meter	Micrograms Per Cubic Meter
Carbon Monoxide						
Maximum 8-Hour Concentration (a)	9	10		9	10	
Maximum 1-Hour Concentration (a)	35	40		35	40	
Hydrocarbons						
Maximum 3-Hour Concentration (a)	0.24		160	0.24		160
Lead						
Maximum Arithmetic Mean Averaged Over Calendar Quarter			1.5			1.5
Nitrogen Oxides						
Annual Arithmetic Average	0.05		100	0.05		100
Photochemical Oxidants						
1-Hour Maximum	0.12		235	0.12		235
Particulates						
Annual Geometric Mean			75			60
Maximum 24-Hour Concentration (a)			250			150
Sulfur Oxides						
Annual Arithmetic Mean	0.03		80			
Maximum 24-Hour Concentration(a)	0.14		365			
Maximum 3-Hour Concentration (a)				0.5		1300

(a) Not to be exceeded more than once a year.

Sources: CFR Part 50 - National Primary and Secondary Ambient Air Quality Standards.
CFR 50.12 "National Primary and Secondary Standard for Lead," 43 FR46245, Oct. 5, 1978.

Environmental Conservation has applied a de minimus criteria of 2.0 ppm for the highest single hour, when concentrations are already near or exceed standards.

3.6.2 Regional Compliance with Standards

To assist the states in attaining and maintaining acceptable ambient air quality levels, air quality control regions (AQCR) were established by the states and approved by the USEPA. The AQCR program was intended to assist in the development of strategies for attaining and maintaining AAQS. The City of New York is part of the New York-New Jersey-Connecticut Interstate AQCR. Within this region, the air quality has been classified according to whether standards for each of the several of the criteria pollutants are met. Where possible, the area is categorized as being in either attainment or non-attainment of the AAQS for these pollutants. Where the attainment/non-attainment status for a pollutant cannot be defined, the area is considered "unclassified" for that pollutant and is treated as being in attainment until proven otherwise. Regions are classified, based on either available monitoring data or modeling results. An area can be designated as in attainment for some criteria pollutants and not in attainment for others. The New York State Department of Environmental Conservation (DEC), based on monitoring data and several other assumptions, classified the attainment status of areas within New York City in 1978. The latest update in area classification occurred in March 1981. Monitoring activities within some of the designated non-attainment areas have shown that portions of these areas now meet the AAQS. Before a non-attainment area can be redesignated as being in attainment, however, a definite trend toward keeping ambient concentrations within standards has to be established.

The attainment status with respect to carbon monoxide, the only criteria pollutant of significance to this project, is discussed below.

Carbon monoxide is monitored at six locations within the City. Two monitors are designed as traffic sites and four monitors are at roof elevations. The traffic sites monitor the impact of motor vehicles, the primary source of carbon monoxide in urban areas. The monitors at roof elevations are exposed to area background values. In 1982, the four roof top monitors did not record a concentration of carbon monoxide in excess of either the one-hour or the eight-hour standards. The second highest one-hour concentration was 11.7 ppm, measured at the Mable Dean monitoring station. The second highest* eight-hour concentration was 8.0 ppm, measured at the PS 321 monitoring station. The traffic sites did not record a violation of the one-hour standard. The second highest recorded level was 21.8 ppm at the Canal Street monitoring station. Several violations of the carbon monoxide eight-hour standard were recorded at both traffic sites. The second highest concentration was 13.0 measured at the Canal Street monitoring station.

In 1982, carbon monoxide concentrations were measured at one station in Queens, located at Queens College. This station recorded roof top values.

* Second highest values are discussed to allow direct comparison to the standards.

The second highest one-hour concentration, measured at the Queens College monitoring station, was 6.9 ppm, and the second highest eight-hour concentration was 4.5 ppm. Both of these values are significantly below the standards.

The entire City of New York has been designated as non-attainment with respect to the NAAQS for carbon monoxide. The only isolated carbon monoxide attainment area identified to date is the northwest corner of Staten Island. However, current modeling results indicate that many areas of the City are already in attainment and that violations of NAAQS occur only at areas with heavy vehicular traffic.

The trends in carbon monoxide concentrations at both roof top locations and traffic sites are clearly downward over the past ten years of data. Concentrations have decreased to levels of one-half to one-third of the levels recorded in the early 1970s. The decrease has been rather uniform throughout the period and the decline is most likely attributable to reduced motor vehicle emissions, due to federally mandated vehicle emission limitations and state vehicle inspection and maintenance programs.

3.6.3 State Air Quality Implementation Plan

Beginning with the 1970 ammendments to the Federal Clean Air Act, New York State has been required to prepare plans showing how National Ambient Air Quality Standards(NAAQS) could be achieved and maintained within the State. State Implementation Plans (SIPs) for controlling transportation--related pollutants in the New York City metropolitan area were prepared by the State and submitted and approved by the USEPA in 1972 and again in is 1979. During the summer of 1983, a draft proposal for revising the SIP for the New York City metropolitan area was prepared by the City of New York and currently under discussion with both the State of New York and the USEPA. It is anticipated that this plan will be approved shortly.

The goal of the 1983 plan is the complete elimination of violations of NAAQS for carbon monoxide in New York City by the end of 1987 with the expeditious mitigation of the traffic conditions that cause these violations. The plan details a number of strategies for achieving its goals. In general, these strategies fall into three groups -- motor vehicle emission controls, traffic control measures and mass transit improvements. Specific strategies contained in the 1983 SIP are:

I. Motor Vehicle Emission Controls

1. Vehicle Turnover
2. Inspection and Maintenance Program (I&M)

II. Traffic Control Measures

1. Red Zone Bus Lane Program
2. Enforcement in Midtown Manhattan

a. Increased Fine Structure
b. Expansion and Reorganization of the Tow Program
c. Surface Transit Enforcement Program (STEP)
d. Concentration of Crosstown Enforcement
e. Construction Enforcement Program
f. Intensified Enforcement Program, Park to Fifth Avenue
g. Operation Clear Lanes

i. No-Exception Tow Policy
ii. New Parking Regulations
iii. $100 Ceiling for Parking Ticket and Penalty
iv. Ticket Taxis Not Pulling up to Curb
v. Tickets and Points on Licenses for Blocking Moving Lanes

3. Queens Midtown Tunnel Lane Reversal
4. Site-Specific Traffic Flow Improvements
5. Computerization of Traffic Signals
6. Using Signals to Meter Vehicles
7. Improved Surveillance
8. Use of New Technologies
9. Parking Controls
10. Expansion of Express Bus and Carpool Lanes
11. Bicycle Lanes and Storage Facilities
12. Private Car Restrictions
13. Park and Ride
14. Pedestrian Priority Zones
15. Land Use Policies and Development Controls

III. Mass Transit Improvements - $8.5 Billion Five-Year Capital Program (1982-1986)

1. New York City Transit Authority
   a. New subway cars and buses.
   b. Expansion of subway car yards so that the entire car fleet can be stored in secured areas.
   c. Programs for rehabilitation and modernization of bus depots.
   d. Infrastructure work remains a high priority, with funding to engineer additional rehabilitation projects.
   e. Passenger related improvements such as car air conditioning and station modernization.
   f. Rehabilitation and modernization of subway maintenance facilities.
2. Long Island Rail Road
   a. Extension of electrification to Ronkonkoma as well as to Northport.
   b. New shop maintenance facilities for both electric and diesel cars.
   c. Improvements to ease train congestion at Jamaica Station.
   d. Additional passenger station improvements.
   e. Completion of West Side storage yard in Manhattan.

3. Metro North Commuter Rail Road
   a. New rolling stock for Upper Hudson and West of the Hudson Services.
   b. Major repairs to the Park Avenue Tunnel.
   c. Additional passenger station improvements, including a new North End Access for Grand Central Station.

3.6.4 Air Quality Receptor Sites

Four air quality receptor sites were selected for the carbon monoxide microscale analysis. These sites were selected along major feeder streets to stations where new or expanded service would result in increased traffic and pollutant levels. Figure 3-8 shows the location of each site and Table 3-11 contains descriptions.

3.7 Noise and Vibration

3.7.1 Noise

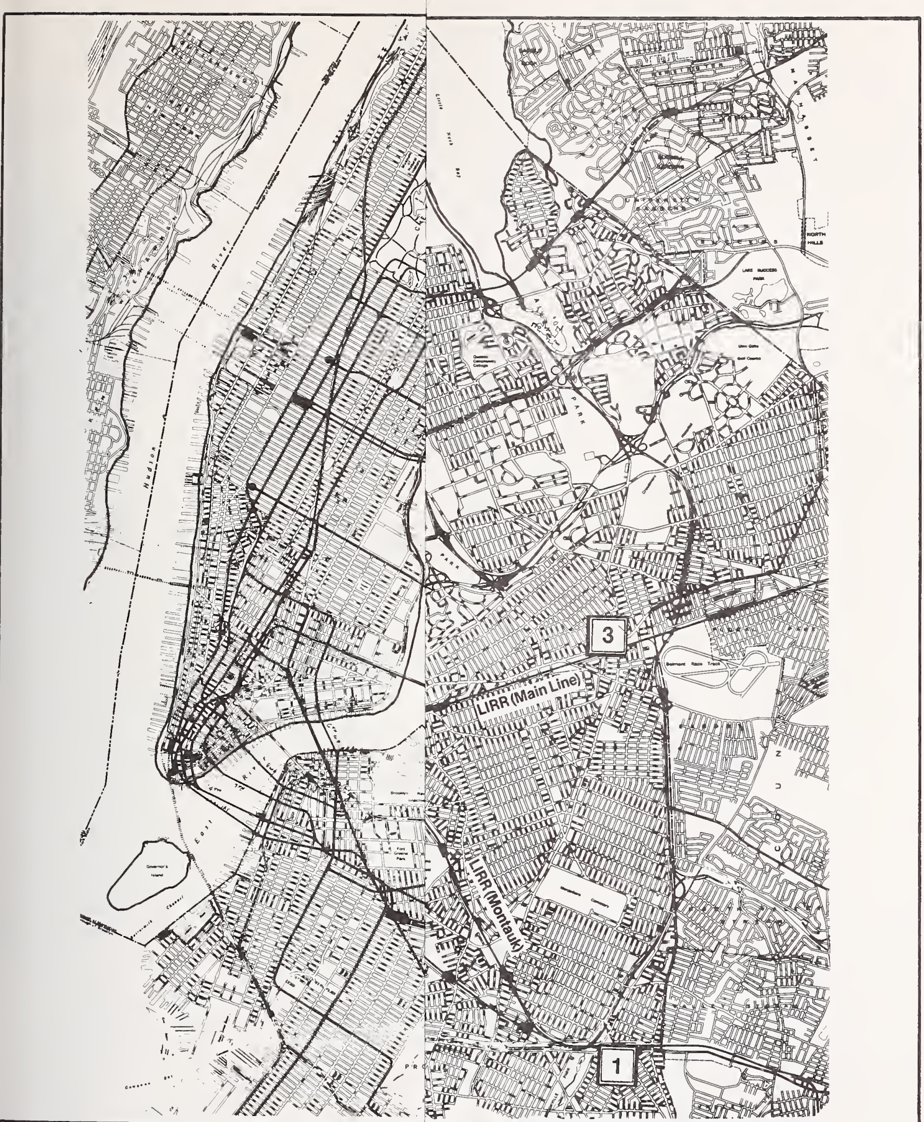
3.7.1(a) Introduction

Noise pollution in an urban area comes from numerous sources. Some are activities essential to the health, safety, and welfare of the City's inhabitants: noise from emergency vehicle sirens, garbage collection operations, and from construction and maintenance equipment. Other sources, such as traffic, stem from the movement of people and goods, activities that are essential to the viability of the City as a place to live and do business. Although these and other noise-producing activites are necessary to a city, the noise they produce is undesirable. Urban noise detracts from the quality of the living environment, and there is increasing evidence that excessive noise represents a threat to public health.

Noise effects can by physiological -- such as hearing loss and the accumulated effects of prolonged sleep loss behavior -- such as interference with speech, learning, and sleep, and subjective -- described by such words as annoyance, nuisance, dissatisfaction, and disturbance.

3.7.1(b) Noise Standards and Criteria

A compendium of various noise criteria will be used in evaluating noise impacts and the significance of noise levels for the various alternatives. These include U.S. Environmental Protection Agency (EPA) criteria relating to noise levels identified as requisite to protect public health and welfare with an adequate margin of safety, U.S. Department of Housing and Urban Development (HUD) site acceptability standards, New York City ambient noise quality criteria, UMTA criteria or evaluating the significance of noise impacts, American Public Transit Association (APTA) noise guidelines, Bolt, Beranek, and Neuman (BBN) criteria relating to the average ability to perceive changes in noise levels, and International Standards Organization (ISO) criteria relating to community response to increases in noise levels. Currently, the State of New York does not have regulations which limit sound



See Table 3-23

AIR QUALITY RECEPTOR SITES

Figure 3-8

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Scale in Feet

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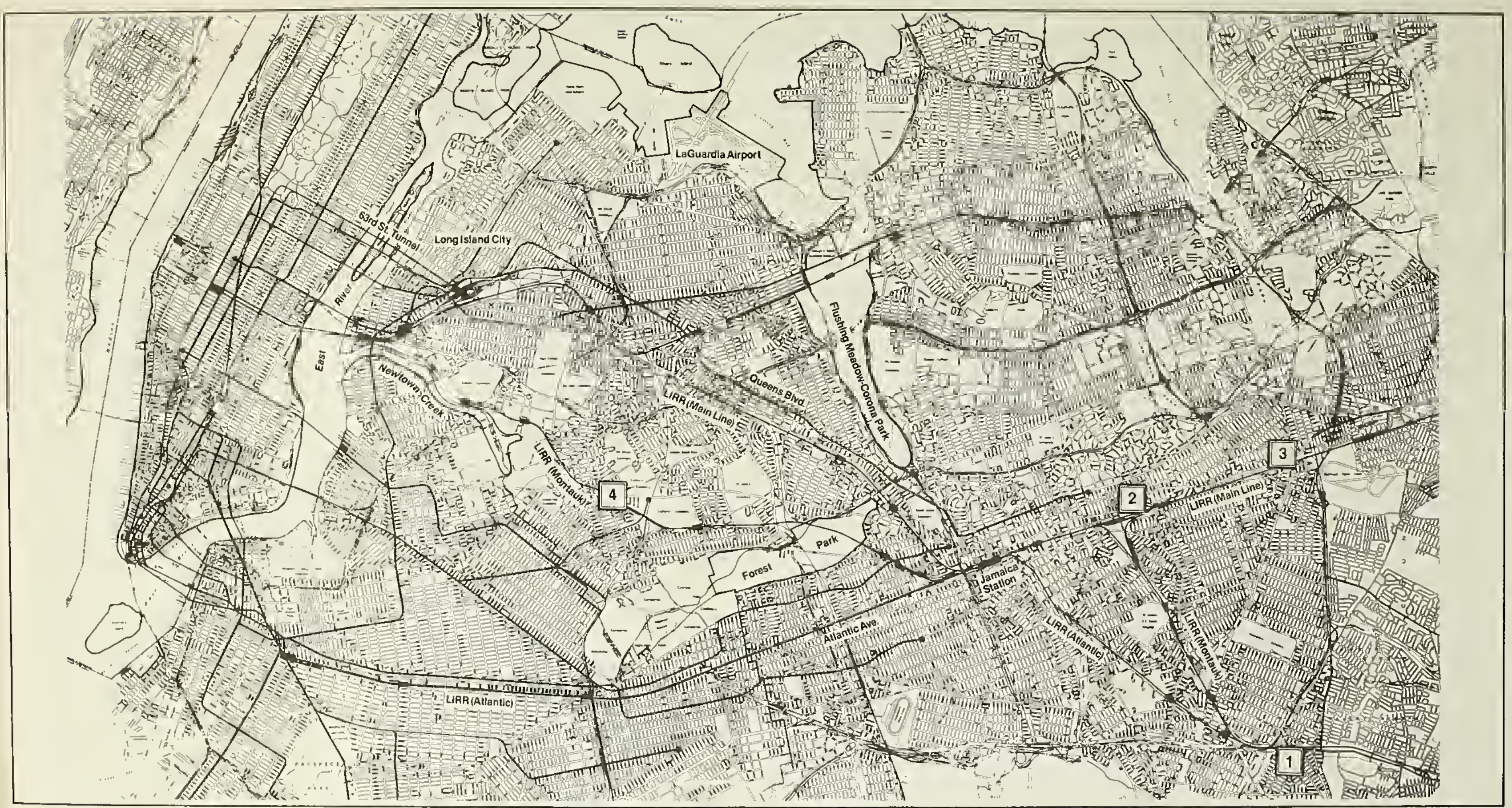

See Table 3-23

AIR QUALITY RECEPTOR SITES Figure 3-8

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TABLE 3-11

AIR QUALITY RECEPTOR LOCATIONS

SITE	LOCATION	DESCRIPTION
1	Francis Lewis Boulevard near 248th Street	Site located at Rosedale Jewish Center on major bus and vehicular feeder route to the Rosedale Station of the Montauk Line of the LIRR
2	Farmers Boulevard at Henderson Avenue	Residential area along major feeder route for bus and vehicular traffic for proposed Hollis Station of the Main Line of the LIRR
3	Springfield Avenue near Jamaica Avenue	Site located at Queens Reformed Church on major feeder route for bus and vehicular traffic to the Queens Village Station of the Main Line of the LIRR
4	Fresh Pond Road near Metropolitan Avenue	Commercial area along major feeder route for vehicular traffic to the proposed Fresh Pond Station of the Montauk Line of the LIRR

levels from proposed facilities such as the alternative Queens Subway improvement options.

3.7.1(c) Ways to Measure Noise

A number of factors affect sound as it is perceived by the human ear. These include the actual level of the sound (or noise), the frequencies involved, the period of exposure to the noise, and changes or fluctuations in the noise levels during exposure. Levels of noise are measured in units called decibels. Since the human ear cannot perceive all pitches or frequencies equally well, these measures are adjusted or weighted to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA.

Since dBA describes a noise level at just one moment, and very few noises are constant, other ways of describing noise over extended periods are needed. Statistical sound level descriptors such as L_1, L_5, L_{10}, L_{50}, L_{90}, and L_x are also sometimes used to indicate noise levels which are exceeded 1, 5, 10, 50, 90, and x percent of the time, respectively. One way of describing fluctuating sound is to describe fluctuating noise heard over a specific time period, as if it had been a steady, unchanging sound. For this condition, a descriptor called the equivalent sound level, L_{eq}, can be computed. L_{eq} is the constant level that in a given situation and time period (e.g., one hour, $L_{eq}(1)$, or twenty-four hours, $L_{eq}(24)$) conveys the same sound energy as the actual time-varying sound.

Alternatively, it is often useful to account for the difference in response of people in residential areas to noises that occur during sleeping hours as compared to waking hours. One method of accounting for the difference between daytime and nighttime exposure is to apply a weighting factor to the nighttime noise. A descriptor, the day-night noise level, L_{dn}, defined as the A-weighted average sound level in decibels during a 24-hour period with a 10 dB weighting applied to nighttime sound levels, is a widely used indicator for such evaluations. L_{dn} has been proposed by the United States Environmental Protection Agency and other organizations as one of the most appropriate criteria for estimating the degree of nuisance or annoyance that increased noise levels will cause in residential neighborhoods.

In addition, because of the intermittent nature of rail noise, the maximum passby noise level, L_{max}, is also of interest, particularly at locations adjacent to exposed track.

Consequently, four noise descriptors -- L_{max}, $L_{eq}(1)$, $L_{eq}(24)$, and L_{dn} -- have been selected as the noise descriptors to be used in the noise impact evaluation of the various project alternatives. Maximum passby and one-hour equivalent sound levels provide an indication of highest sound levels and are most telling as a measure of project impact on an hour by hour basis; while maximum twenty-four hour and day-night equivalent sound levels permit direct comparison against noise levels identified by the EPA as requisite to protect public health and welfare, and provide a more general indication of the impact of the various project alternatives on residents of the adjacent area.

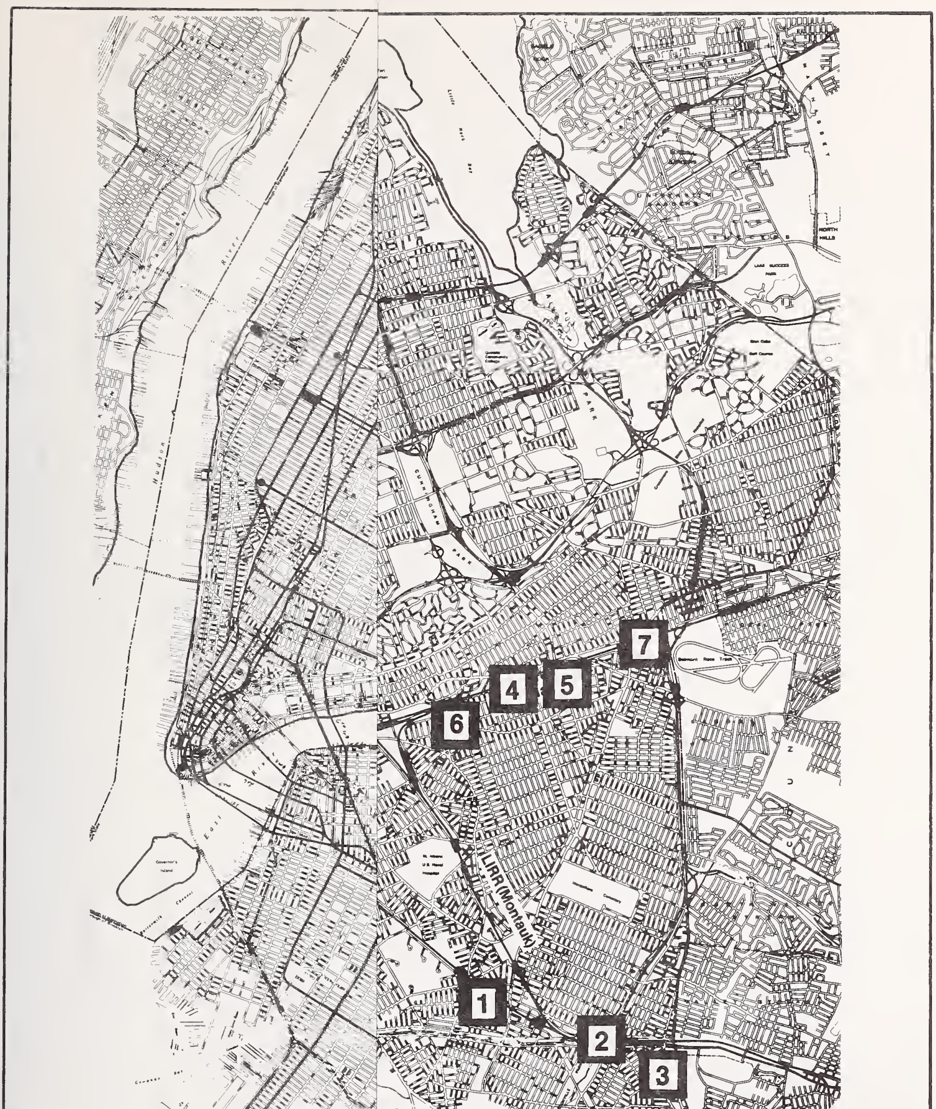
3.7.1(d) Noise Measurement Program

A field monitoring program was undertaken to determine existing noise levels. Measurements were taken at 21 locations adjacent to proposed rail rights-of-way, along major or feeder streets to proposed new or enlarged stations and adjacent to the proposed Fresh Pond Freight Yard. Measurements were made using a Bruel & Kjaer Noise Level Analyzer Type 4426 for sites 1 through 16 and a Metrosonics db-603 Sound Level Analyzer System for sites 17 through 21. Continuous 24-hour measurements were made at four of the 21 locations, and at the remaining 17 sites, except at site 20, twenty to thirty minute measurements were made during five time periods (AM peak, midday, PM peak, pre-midnight, and post-midnight). At site 20, twenty minute measurements were made for two measurement periods, an AM and a midday, to correspond with school hours. Figure 3-9 shows the locations of the 21 monitoring stations. Table 3-12 contains a description of each of the sites and identifies the dominant noise source or sources at each location.

Table 3-13 summarizes the results of the noise monitoring program. One-hour equivalent sound levels, $L_{eq(1)}$, measured at each of the monitoring sites along with the 24-hour equivalent, $L_{eq(24)}$, and day-night, L_{dn}, noise levels are shown in the table. Noise levels at almost all of the sites are high and exceed most of the noise standards and criteria previously enumerated. For example, in terms of $L_{eq(24)}$ values all 21 sites had values of 55 dBA or more, 17 sites had values of 60 dBA or more, 13 sites had values of 65 dBA or more and nine sites had values of 70 dBA or more (Note: less than 70 dBA is the EPA identified value necessary to prevent hearing loss.) Similarly, in terms of the L_{dn} values all 21 sites had values of 55 dBA or more, 18 sites had values of 60 dBA or more, 15 sites had values of 65 dBA or more, nine sites had values of 70 dBA or more, and one site had a value of above 80 dBA. (Note: less than 55 is the EPA identified value recommended to avoid interference and annoyance with outdoor activities.) Similar results are obtained in terms of the L_{eq}(1) values and the maximum values range between 61.7 and 87.8 dBA. In terms of NYC CEQR noise standard classification levels, most sites are either in the marginally unacceptable or clearly unacceptable classification category.

In addition, as noted, many of the monitoring locations were immediately adjacent to rail rights-of-way. At each location maximum rail passby noise levels ranging from the high 70's to over 100 dBA were measured. Consequently, it can be concluded that at each location noise levels are not only high but passing trains create noise level fluctuations which are intrusive and annoying in character.

A detailed description of the monitoring sites, site maps, and the full statistical output from the noise monitoring program is contained in the Technical Supplement to the DEIS.



See Table 3-24

INDEX FOR NOISE MONITORING SITES

Figure 3-9

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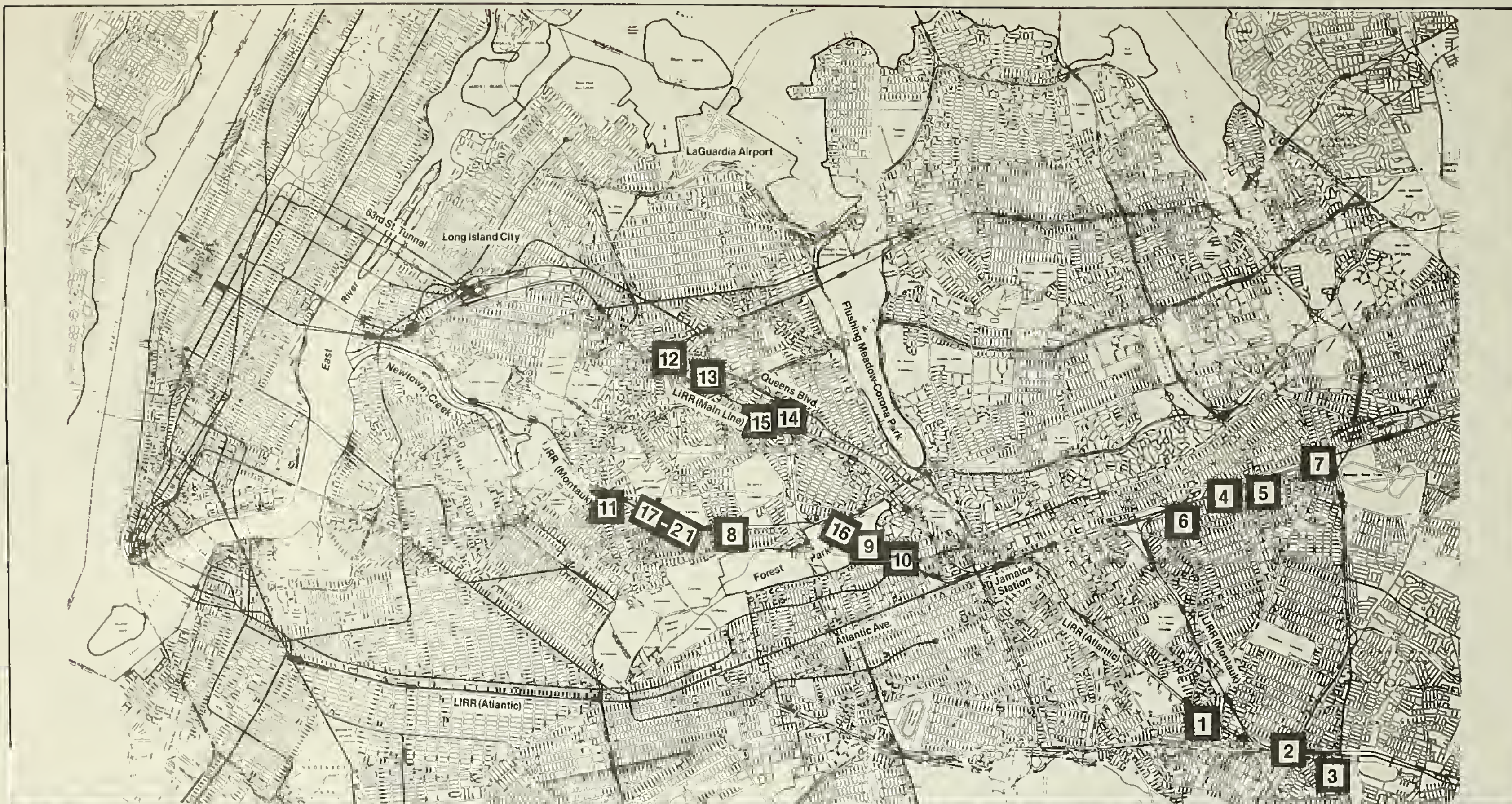


See Table 3-24

INDEX FOR NOISE MONITORING SITES

Figure 3-9

TABLE 3-12

NOISE MONITORING SITE DESCRIPTIONS

Site	Location	Description
1.	Westgate St. at 137th Ave.	Residential site along the Atlantic Branch of the LIRR in the vicinity of the Locus Manor Station.
2.	North Conduit Ave. near 233rd St.	Playground located east of the intersection of the Montauk and Atlantic Branches of the LIRR, adjacent to North Conduit Ave. and the Southern State Parkway.
3.	Francis Lewis Blvd. near 248th St.	Site located at Rosedale Jewish Center on major bus feeder route to the Rosedale Station of the LIRR.
4.	202nd St. near Jamaica Ave.	Park Site adjacent to the Main Line of the LIRR.
5.	99th Ave. near 209th St.	Residential site along the Main Line of the LIRR.
6.	Farmers Blvd. at Henderson Ave.	Major feeder route for bus and vehicular traffic for proposed Hollis Station.
7.	Springfield Blvd. near Jamaica Ave.	Site located at Queens Reformed Church on major feeder route for bus and vehicular traffic to the Queens Village Station.
8.	77th Ave. at 79th Pl.	Residential site along the Montauk Branch of the LIRR.
9.	Babbage St. near 115th St.	Residential site along the Montauk Branch of the LIRR.
10.	Lefferts Blvd. at Jamaica Ave.	Commercial site with nearby residential uses adjacent to the intersection of the Main Line of the LIRR and Jamaica Line of the TA.
11.	Fresh Pond Rd. near Metropolitan Ave.	Major feeder route for vehicular traffic to the proposed Fresh Pond Station.
12.	Kneeland Ave. at Ireland St.	Residential site along the Main Line of the LIRR.
13.	Haspel St. at 56th Ave.	Residential site along the Main Line of the LIRR.
14.	Austin St. at 67th Ave.	Park site near the Mishkan Israel Rabbinical Seminary and adjacent to the Main Line of the LIRR.
15.	Alderton St. at 63rd Dr.	Residential site adjacent to the Main Line of the LIRR.
16.	Forest Park	Wooded area at the east end of the park adjacent to the Montauk Branch of the LIRR.
17.	Traffic Avenue at 64th Street	Residential site adjacent to proposed Fresh Pond Freight Yard.
18.	Glen Ridge Park	Park site adjacent to proposed Fresh Pond Freight Yard.
19.	Otto Road at 68th Street	Residential site adjacent to proposed Fresh Pond Freight Yard.
20.	Christ the King High School	School adjacent to proposed Fresh Pond Freight Yard.
21.	Admiral Avenue near 65th Street	Residential site adjacent to proposed Fresh Pond Freight Yard.

TABLE 3-13

EXISTING NOISE LEVELS*

Descriptor	Time	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
$L_{eq}(1)$	12-1AM	59.3		61.0	63.6		59.7	60.9	50.7		78.3
	1-2AM		60.3	61.0		62.7		56.6		65.1	76.5
	2-3AM			62.2				58.9			77.6
	3-4AM			63.0				56.2			79.0
	4-5AM			57.9				59.5			78.1
	5-6AM			59.1				60.6			83.5
	6-7AM		74.3	62.0				65.2			87.3
	7-8AM	68.6		63.6	69.8	77.5	69.2	67.9	63.5	79.5	87.1
	8-9AM			64.3				68.5			86.1
	9-10AM			66.3				66.9			86.4
	10-11AM			66.3	65.1	70.4	65.2	66.1		74.1	83.2
	11-12AM		68.9	64.4				71.8			81.9
	12-1PM	63.0		65.1				71.8	55.8		80.3
	1-2PM			65.0				72.9			82.0
	2-3PM			65.6				74.2			82.1
	3-4PM			66.2				71.3			85.9
	4-5PM		72.5	65.4		75.6		64.6		78.3	86.4
	5-6PM	67.2		64.1	67.7		68.5	63.5	64.2		87.8
	6-7PM			62.9				63.1			86.1
	7-8PM			61.4				64.2			82.4
	8-9PM			60.8				67.6			83.9
	9-10PM			60.6				68.6			80.7
	10-11PM	61.7		61.4	64.4		61.4	60.8	53.1		81.8
	11-12Mid		61.5	61.8		64.5		64.3		67.3	79.3
$L_{eq}(24)$**		65.3	70.4	63.5	66.2	73.4	66.2	67.9	60.5	75.8	83.8
L_{dn}**		68.7	76.5	68.3	71.2	74.8	69.1	70.2	62.3	77.3	88.6

* All values in dBA.

** Derived quantities.

TABLE 3-13 (continued)

EXISTING NOISE LEVELS*

Descriptor	Time	Site 11	Site 12	Site 13	Site 14	Site 15	Site 16	Site 17	Site 18	Site 19	Site 20	Site 21
$L_{eq}(1)$	12-1AM	59.3	50.6	59.3	59.6		43.5	56.0	52.0			49.0
	1-2AM				59.1	51.3				48.0		
	2-3AM				58.5							
	3-4AM				56.3							
	4-5AM				54.2							
	5-6AM				58.3							
	6-7AM	67.3			67.7	64.7						
	7-8AM		61.7		74.7		64.5					
	8-9AM			72.5	74.1				61.0	68.0		
	9-10AM				69.2			60.0				55.0
	10-11AM				68.1						52.0	
	11-12AM	64.6			67.2	58.6						
	12-1PM		53.1	66.1	66.8		44.8					
	1-2PM				68.1				57.0			
	2-3PM				70.0			63.0			58.0	62.0
	3-4PM				72.9					64.0		
	4-5PM			70.9	69.7							
	5-6PM	66.7	60.2		70.4	67.0	60.6		63.0			
	6-7PM				68.2			63.0		66.0		58.0
	7-8PM				62.4							
	8-9PM				61.2							
	9-10PM				60.2					51.0		
	10-11PM	61.5	51.3	62.5	61.3		43.7	60.0	51.0			51.0
	11-12Mid				60.7	54.5						
$L_{eq}(24)$**		64.8	57.8	68.7	68.0	62.6	59.1	60.6	58.8	64.0	55.3	57.3
L_{dn}**		70.8	60.2	70.1	70.5	67.8	59.9	65.0	62.3	67.1	59.4	59.7

* All values in dBA.
** Derived quantities.

3.7.2 Vibration

3.7.2(a) Introduction

In the design of a transit system, vibration during construction and operation is an important consideration, if the system is to have a high degree of acceptability. While transit-system-generated vibration is generally below levels that are hazardous to humans, it can have effects on the environment that are perceived to have a negative impact on the quality of life in the areas through which the system operates. Therefore, it is necessary to establish vibration criteria with negligible risk of complaint, which serve as the basis for quantification of the impact of any change in the vibration levels.

The dominant source of the vibration is the rail/wheel interface, which is transmitted through the track and support structure and the intervening soil and rock to nearby buildings. Problems may occur adjacent to subway, at-grade, and elevated structures, and controls must be considered for all types of track structures.

Vibration may:

- damage structures;
- be perceptible as "feelable" vibration;
- be annoying to humans; and/or
- generate annoying noise.

3.7.2(b) Damage to Structure

In general, while structural damage can occur due to excessive vibration levels, experience has shown that there is little likelihood of such damage occurring from vibrations generated by operation of transit systems, except in highly unusual situations. The NYCTA has reported that in only one of the hundred complaints they have investigated has the level been reached that would indicate possible damage to structures exposed to subway vibration. Therefore, consideration should be given to identification of any abnormal situation that could produce vibration level in excess of the damage criteria.

3.7.2(c) Perceptibility

Perceptible vibration produces annoyance and concern over damage to structures. Research has determined only appropriate levels of human response to building vibration. For example, NYCTA experience has found that vibration levels, 20 decibels (dB) below published feelability threshold criteria, have often generated complaints.

3.7.2(d) Vibration Descriptors and Evaluation Criteria

There are a number of different descriptors that can be used to characterize vibration. For this study, acceleration was selected as the most appropriate vibration descriptor for evaluating groundborne vibration due to rail operation. This descriptor has been widely used on transit and other projects for assessing impact both in terms of structural damage and annoyance. Also, construction impacts are best evaluated in terms of the acceleration descriptor.

For evaluating building vibration due to transit operations, the criteria presented in the Handbook of Urban Rail Noise and Vibration Control (PB 82-22075, February 1982), based upon recent data from the WMATA, MARTA and TCC on building vibration and on a weighted vibration level curve developed by the CHABA (the Committee on Hearing, Bioacoustics and Biomechanics of the National Research Council) for measuring or evaluating human response to environmental vibration, are used. As can be seen from the table below, these criteria are presented as a range of values (measured by dB RE 106g) in terms of the annoyance criteria associated with transit operations.

EVALUATION CRITERIA: HUMAN RESPONSE TO BUILDING VIBRATION

Imperceptible	less than 43 (dB RE 10^{6}g)
Barely Perceptible	43 - 53
Distinctly Perceptible	51 - 61
Disagreeable	more than 60

3.7.2(e) Existing Vibration Levels

A vibration monitoring program was carried out to determine the existing vibration levels at eight locations. The locations chosen are described in Table 3-14 and shown on Figure 3-10. Where these locations were near existing rail or subway lines, the data relate to the period during train pass-bys. One location was monitored in order to determine if there are any existing vibration levels of importance in an area where new facilities would be constructed.

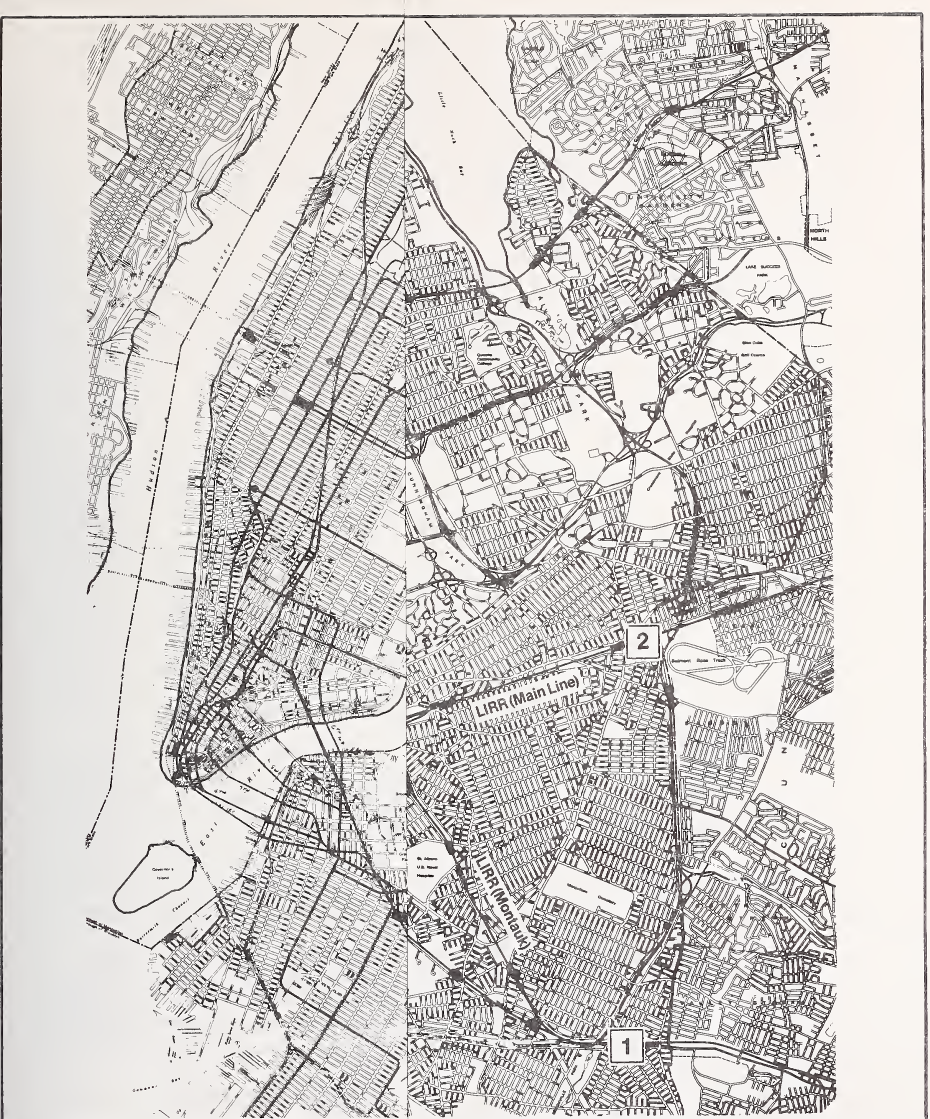
The measurements made were of ground vibration at the various locations close to the ROW during periods of train operation. Direct comparisons between the recorded vibration levels and the levels perceived at the buildings close to the sites depend on the location and type of building exposed to the vibration. In general, because of distance and decoupling due to building mass, the perceived levels would be reduced by 10 to 30 dB over the levels recorded.

Table 3-15 presents the adjusted nominal vibration levels for each site monitored. The values presented have been reduced by a factor of 20 dB to account for distance and decoupling and are the midpoint of the maximum and minimum levels observed.

TABLE 3-14

Vibration Monitoring Site Description

Site	LOCATION	DESCRIPTION
1	North Conduit Ave. near 243rd St.	Site is within parking lot adjacent to the Rosedale Station of the Montauk Line of the LIRR, which at this location is on fill.
2	97th Ave. at 220th Street	Site is located at Queens Village adjacent to the Main Line of the LIRR, which at this location is on fill.
3.	Northern Blvd. near 40th Road	Site is surrounded by TA subway and elevated services including the Queens Blvd., Flushing, and Astoria Lines, and is adjacent to the Sunnyside Yards.
4.	Queens Blvd. near 69th Road	Site is located in the Gerald McDonald Memorial Park adjacent to the TA Queens Blvd. subway lines.
5.	72nd Street at Edsall Street	Site is located in a residential area of Glendale adjacent to the Montauk Line of the LIRR which at this location is at-grade.
6.	Babbage St. at 117th Street	Site is located in Richmond Hill adjacent to the Montauk Branch of the LIRR which at this location is on structure.
7.	89th Avenue and 132nd Street	Site is adjacent to the Main Line of the LIRR and a few blocks from the elevated TA Jamaica Lines.
8.	Roosevelt Avenue near 60th St.	Site is located in Woodside adjacent to the elevated Main Line of the LIRR and the TA Flushing Line.



INDEX FOR VIBRATION MONITORING SITES

Figure 3-10

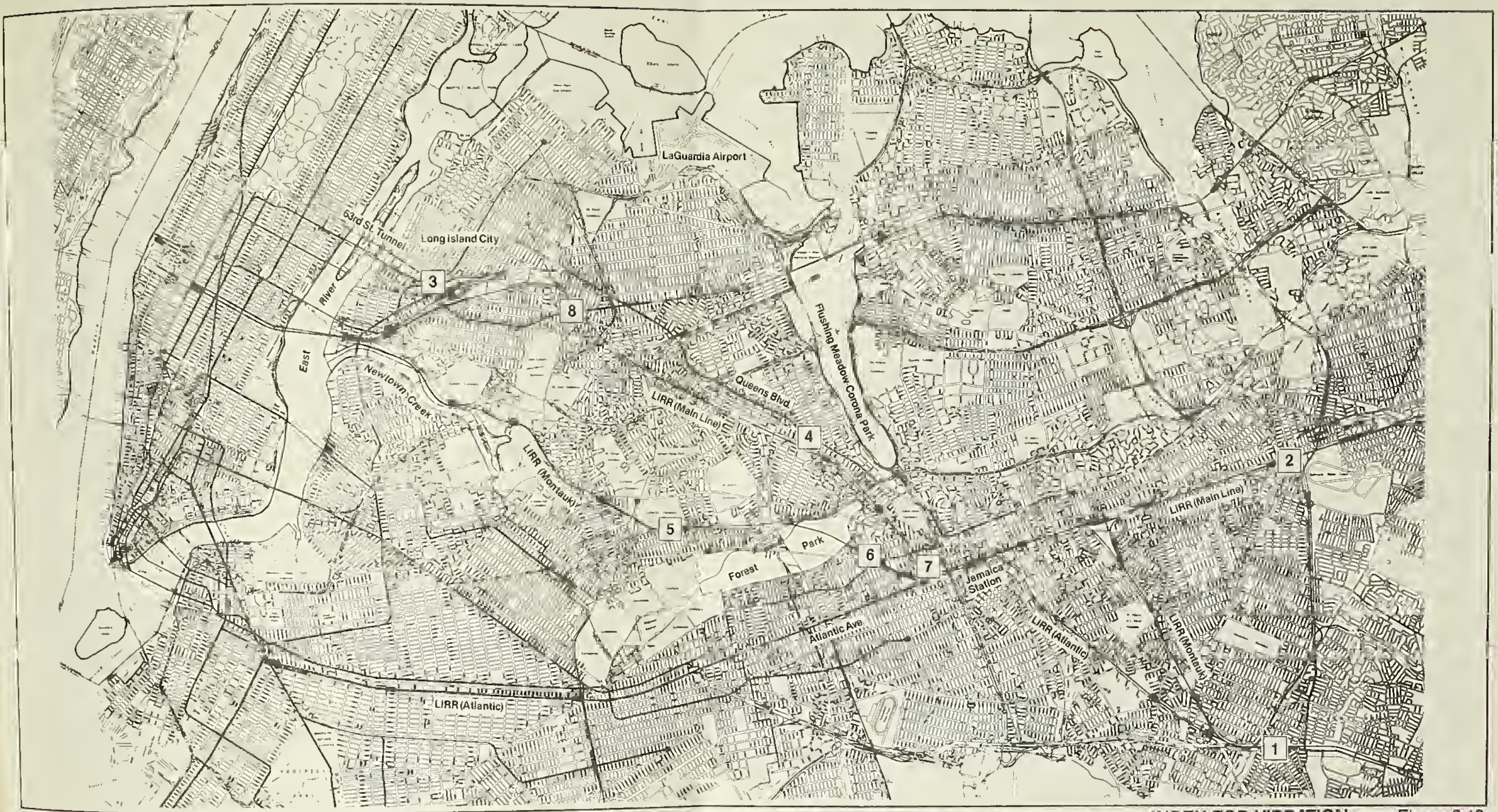
Legend

1	Rosedale Station
2	Queens Village
3	Northern Boulevard Connection
4	Yellowstone Boulevard

0 6000

Scale in Feet

N



INDEX FOR VIBRATION MONITORING SITES Figure 3-10

Legend

1 Rosedale Station
2 Queens Village
3 Northern Boulevard Connection
4 Yellowstone Boulevard
5 Glendale/72nd Street
6 Richmond Hill
7 130th Street
8 Woodside Roosevelt Avenue

0 6000
Scale In Feet

N

TABLE 3-15
EXISTING VIBRATION LEVELS

SITE	dB RE 10^{6}g	Meters/sec^{2}
1	48	.0024
2	53	.0043
3	49	.0027
4	36	.0062
5	50	.0030
6	56	.0060
7	52	.0038
8	47	.0021

A review of the adjusted nominal values in terms of the evaluation criteria indicates that the vibration levels at Sites 1, 3, 5 and 8 fall into the range associated with barely perceptible. Sites 2 and 7 fall within the higher end of the barely perceptible range and low end of the distinctly perceptible range. The value for Site 4 is within the imperceptible range. However, the vibration recorded at Site 4 was of passing traffic, since at the present time there is no rail traffic near this location. Site 6 is within the distinctly perceptible range.

3.8 Water Resources

3.8.1 Introduction

The provision of new or expanded transit service to the Borough of Queens may impact the water resources of the region directly as might occur during construction or indirectly through stimulation of population growth which would subsequently increase the demand for water supply and subsequent sewage disposal. Since Queens is substantially developed at this time, the likelihood of large population growth due exclusively or even largely from improved transit availability is low. Direct impacts are, however, likely as significant construction is associated with some of the alternatives.

The two areas of potential impact on water resources are surface waters and groundwater. Surface waters may be impacted by contaminated stormwater runoff and increased sewage disposal needs. Groundwater may be impacted by increased demand for water supply and the need to dewater construction sites and underground tunnels associated with subways.

3.8.2 Surface Water Quality

3.8.2(a) Queens Sewerage

The Borough of Queens generates an estimated 330 million gallons of wastewater each day. This wastewater is treated at five separate water pollution control plants before being discharged to adjacent water bodies.

Four treatment plants are located in Queens; the Bowery Bay Water Pollution Control Plant (WPCP) located in Astoria discharges to the East River; Tallmans Island WPCP located in Whitestone also discharges its effluent to the East River; the Jamaica WPCP discharges to Jamaica Bay; and the Rockaway WPCP located on the Rockaway peninsula also discharges to Jamaica Bay. One treatment plant, Newtown Creek, is located in Brooklyn. The East River is the recipient of its effluent.

Figure 3-11 illustrates the areas in Queens served by the aforementioned plants. The Bowery Bay Water Pollution Control Plant serves northwest Queens, Tallmans Island serves northeast Queens, the Jamaica plant serves southern Queens, the Rockaway facility serves only the Rockaway peninsula and the Newtown Creek plant serves the western edge of Queens.

3.8.2(b) Receiving Waters

The East River and Jamaica Bay are the two water bodies which receive effluent from the treatment plants serving Queens.

The East River is actually a tidal strait which connects the Upper New York Bay with the Long Island Sound some 16.5 miles to the northeast. The river's flow is controlled by the difference in tidal elevation between upper New York Bay on the south and Long Island Sound to the north and east.

Water quality in the East River reflects its use as the receiving water for five major sewage treatment plants, combined sewer outflows, the cooling water discharges from numerous power generating facilities, and the tidal circulation patterns which carry untreated sewage from the west side of Manhattan into the lower river during the early flood tides. However, in spite of the tremendous quantities of pollutants discharging to the river, the intense flushing action in this tidal strait allows reasonable water quality to be maintained for its prescribed use mainly as a fish passage and a commerce route.

The New York State Department of Environmental Conservation (NYSDEC) has adopted water standards to be maintained in the East River. The River from the Battery to the Whitestone Bridge is classified SD -- for fish passage. Northeast of the bridge it is classified I -- for fishing and secondary contact recreation. For either classification no coliform standard is issued. The standard for dissolved oxygen is not less than 3.0 milligrams per liter (mg/l) for fish passage and not less than 4.0 mg/l for fishing.

These standards are met for all periods of the year except late summer when dissolved oxygen usually drops below the standards in both the upper and lower East River. The construction of the Red Hook Treatment Plant and the upgrading of the Newtown Creek Sewage Treatment Plant, both which are anticipated to be completed by 1988, will enable the East River to meet standards at all times.

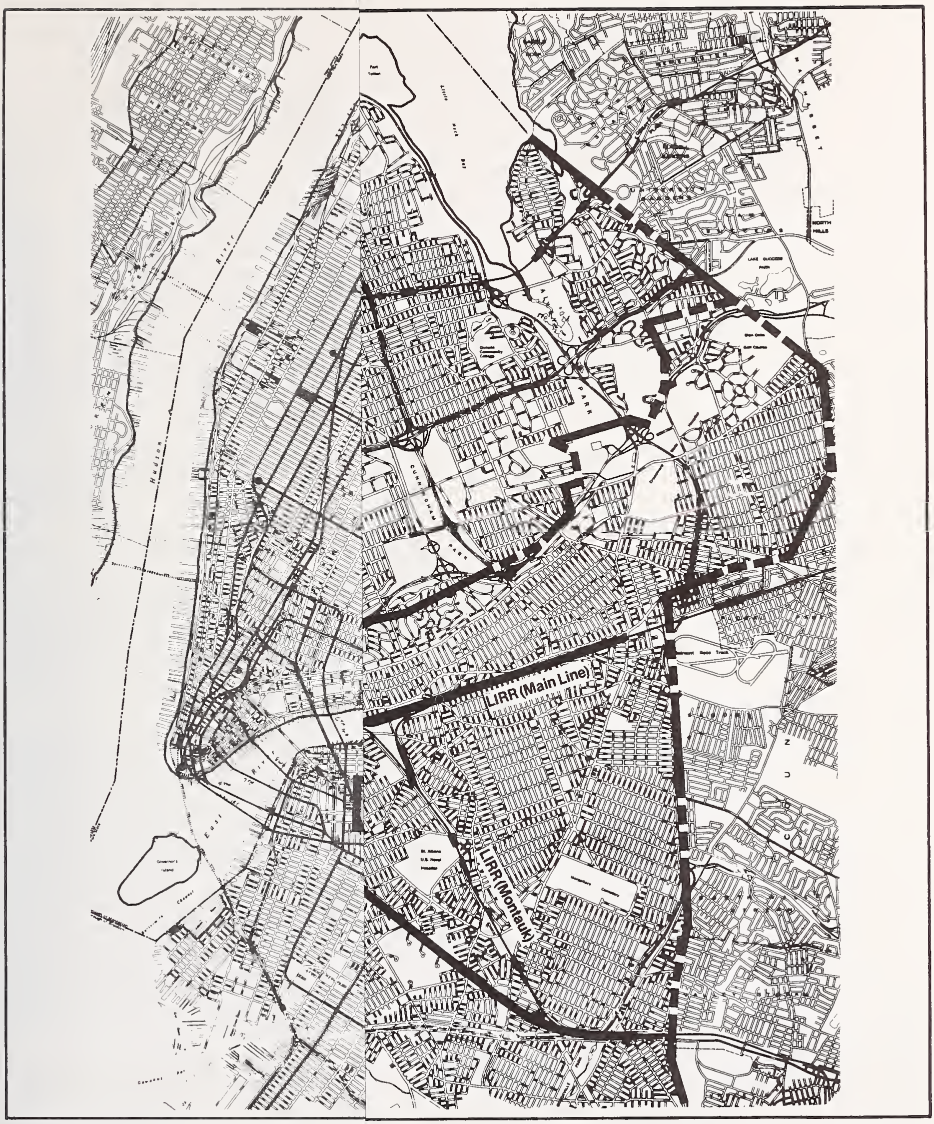
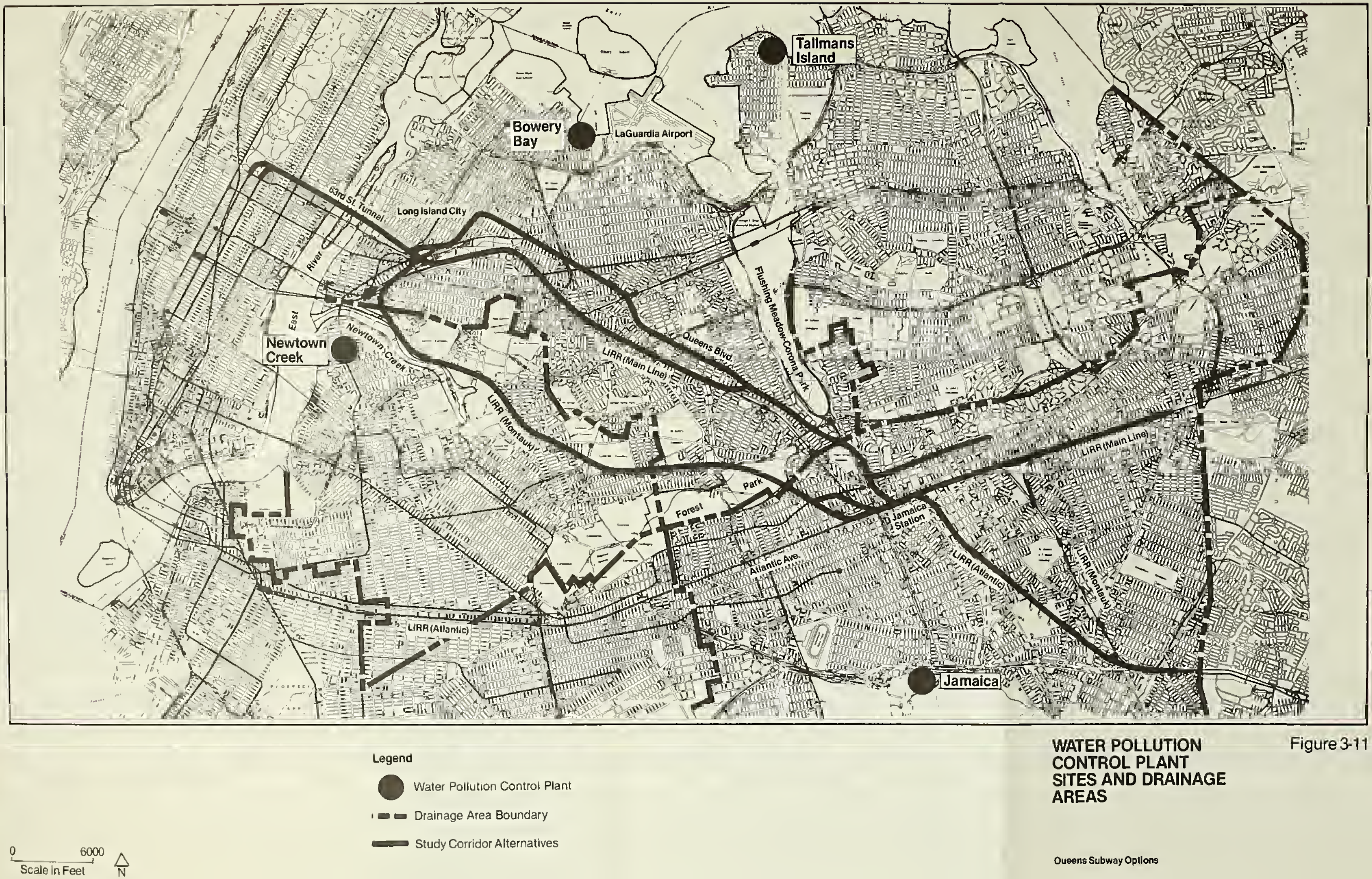


Figure 3-11

WATER POLLUTION CONTROL PLANT SITES AND DRAINAGE AREAS

0 6000
Scale in Feet
N



WATER POLLUTION CONTROL PLANT SITES AND DRAINAGE AREAS

Figure 3-11

Jamaica Bay is classified suitable for swimming by the NYSDEC; however, the New York City Department of Health does not classify it as such. Presently its use for non-contact recreation such as boating and fishing has not been impaired.

Jamaica Bay receives the effluent from three Water Pollution Control Plants: Jamaica Bay discharging 100 mgd (million gallons per day); Rockaway discharging 20 mgd; and 26th Ward discharging 80 mgd for a total of 200 mgd. The Coney Island WPCP effluent which is discharged to the Rockaway Inlet also has an effect on the water quality in the Bay through the action of the tides. Jamaica Bay is also the recipient of numerous combined sewer overflows which contribute to water quality degradation during storm events. Jamaica Bay receives freshwater inputs from several small tributaries surrounding its perimeter. Tidal exchange from lower New York Harbor occurs through the Rockaway Inlet on the western end of the Bay.

Despite being the recipient of a large quantity of sewage and untreated stormwater, Jamaica Bay still meets the criteria for secondary contact recreation.

3.8.3 Groundwater Resources

Within Queens, an average of 280 million gallons of water is used each day. Sixty-two and a half million gallons, or 22 percent, is supplied by the Jamaica Water Supply Company from groundwater sources. The remaining 217.5 million gallons is derived from the New York City Municipal Water Supply System.

The 62.5 mgd which is supplied by the Jamaica Water Supply Company is pumped from local aquifers in eastern Queens. This represents the water supply of more than 500,000 people and about 7,600 commercial and industrial users in southeast Queens. Of the 62.5 mgd pumped from local aquifers in Queens County, 16.6 mgd is pumped from the upper glacial aquifer, 38.9 mgd from the Magothy-Jameco aquifer (37.7 mgd from the Magothy aquifer and 1.6 from the Jameco acquifer) and about 7 mgd from the Lloyd aquifer. The upper glacial aquifer is the water table aquifer with a range of thickness from zero to 300 feet. The upper surface of the Jameco aquifer can be found 90 to 200 feet below National Geodetic Vertical Datum* (NGVD) with a thickness of up to 200 feet. The Magothy aquifer's upper surface can be found anywhere from 40 feet above to 400 below NGVD with a thickness of up to 500 feet. The Lloyd aquifer, the deepest formation, has an upper surface ranging from 90 to 825 feet below NGVD with a thickness of up to 300 feet.

The franchise area for the Jamaica Water Supply Company is roughly bounded by Lefferts Boulevard to the west, the Grand Central Parkway to the north, Jamaica Bay to the south and to the east it extends somewhat into Nassau County.

*The NGVD was set equal to Sea Level in 1929.

The U.S. Geological Survey measured water levels in 34 wells in Queens and 29 wells in Brooklyn from February through June 1981. The water table is above sea level in all of Kings County and northeast Queens. High water levels are also found in northern Queens County.

The groundwater of Queens has been contaminated from development overlying the aquifer and intense use for water supply. This is exhibited by elevated chloride and nitrate levels. Chloride concentrations in virtually all of the upper glacial aquifer is more than 40 mg/l. Higher concentrations of chloride are exhibited near the shore where salt-water intrusion would be expected. In the Magothy-Jameco aquifer, chloride concentrations were lower than in the upper glacial aquifer. Water from all but five of the 24 wells tested by the U.S.G.S. in Queens County had concentrations of less than 42 mg/l, and only three showed concentrations exceeding 60 mg/l. Twelve wells in the Lloyd Aquifer were sampled by the U.S.G.S in Queens County. The inland chloride concentration ranged from 1 mg/l to 15 mg/l, suggesting that water in this aquifer and in most areas of Queens is near predevelopment quality.

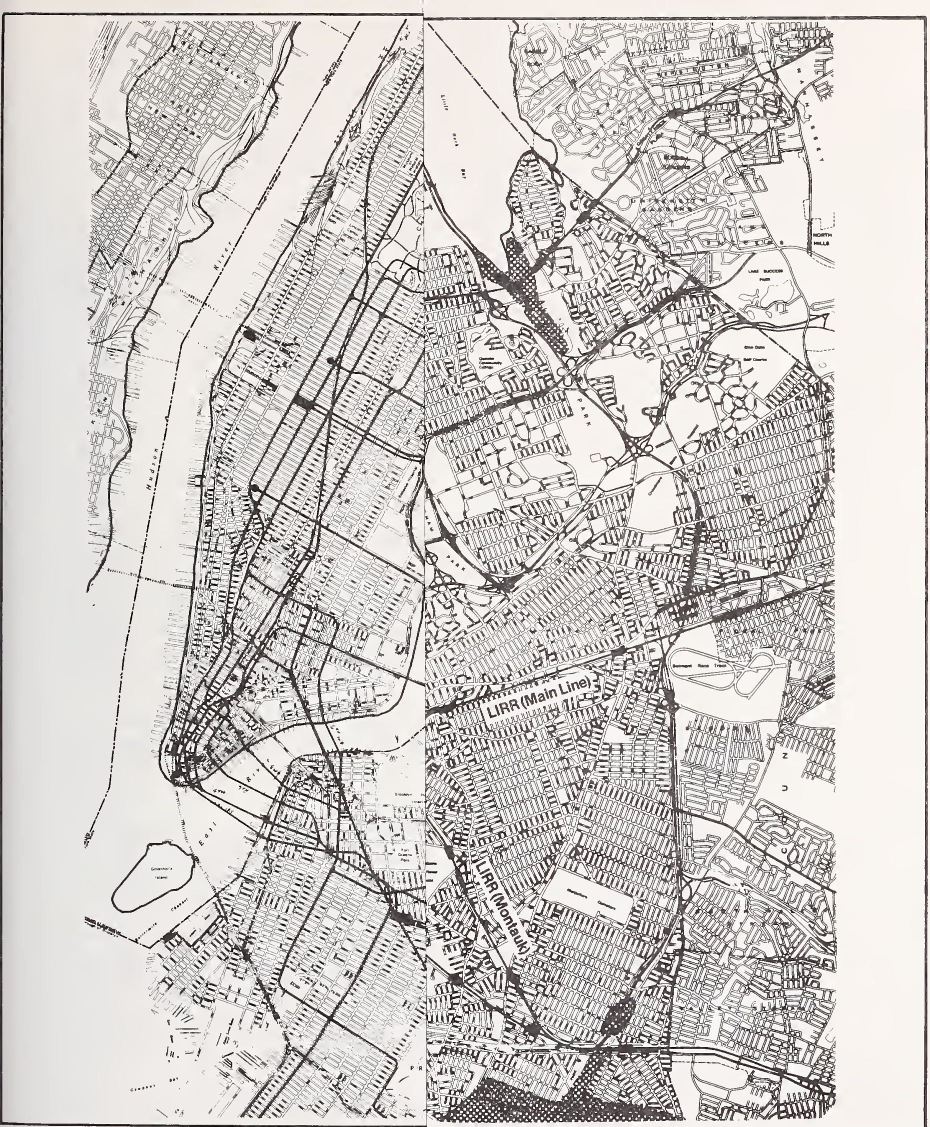
Nitrate contamination of groundwater is much more severe in Brooklyn than in Queens. The contamination of the upper glacial aquifer decreases as one moves eastward from Kings County. Of the 47 wells sampled in Queens County (upper glacial) all but ten samples had nitrate (as N) concentrations lower than 10 mg/l. Nitrate (as N) concentrations in the Mogothy-Jameco aquifer in Queens County ranged from 0.1 mg/l to 7.6 mg/l. The Lloyd aquifer exhibited nitrate (as B) concentrations from 0.1 mg/l to 6 mg/l. Eleven wells were sampled from inland areas; six had concentrations of nitrate within the estimated predevelopment levels (0.2 mg/l), and only three exceeded 1.2 mg/l.

In summary, the groundwater of Queens is used as a drinking water supply in this eastern portion of the County. While evidence of contamination is observed, these waters meet all applicable criteria for use as drinking water.

3.8.4 Flooding

In Queens County, the issue of flooding is primarily associated with shoreline areas and malfunctioning sewers. This section addresses flooding of natural waterways as defined by the Federal Emergency Management Agency's (FEMA) Flood Insurance Program. Figure 3-12 presents the 100-year floodplains near the proposed project sites in Queens County. The only areas experiencing significant flooding in the area are Newtown Creek and the Flushing Bay-Meadow Lake-Willow Lake system.

The area known to experience flooding from inadequate sewers is an area north and west of Woodside. This area is low, draining towards the East River. During high spring tides and extreme rainfall events, flooding occurs in this area.



100-YEAR FLOODPLAINS Figure 3-12

0 6000
Scale in Feet
N

100-YEAR FLOODPLAINS Figure 3-12

0 6000
Scale in Feet
N

3.9 Parklands

3.9.1 Applicable Legal and Regulatory Requirements

Section 4(f) of the Department of Transportation Act requires that "special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges and historic sites." The Act states that the Secretary of Transportation shall not approve a project if it requires use of those areas unless:

(1) There is no feasible and prudent alternative to the use of such land, and

(2) Such program includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use.

3.9.2 Description of Potentially Affected Sites

In response to these requirements, an inventory of all parklands which might be impacted by the alternatives was completed. Potentially impacted parks are those immediately adjacent to or within a few blocks of surface alignments where construction will be necessary, or where the number of passing trains on existing tracks will increase. Table 3-16 lists all the parklands included in the inventory, and Figure 3-13 locates them in relation to the alignments.

The following brief descriptions of each of the park sites gives some indication of each one's proximity to the alignments and other information on level of use and access. The numbers are the same as those used in Table 3-16.

1. Playground. This playground connected to Long Island City High School is a large paved area with basketball backboards. The playground is separated by 29th Avenue from construction on the parking lot under which the 63rd Street Tunnel will be extended.

2. McKenna Square, Capt. M. Rafferty Square, Albert E. Short Square, Patrick J. Gleason Square and Court Square. These small areas are basically traffic islands around the parking lot under which the pedestrian passageway will be built for the Queens Boulevard Line -- Local Connection option. Court Square is an attractive sitting area in front of the New York State Supreme Court.

3. George F. Torsney Playground. This playground is next to the Sunnyside Yards, some 600 feet from the LIRR Main Line.

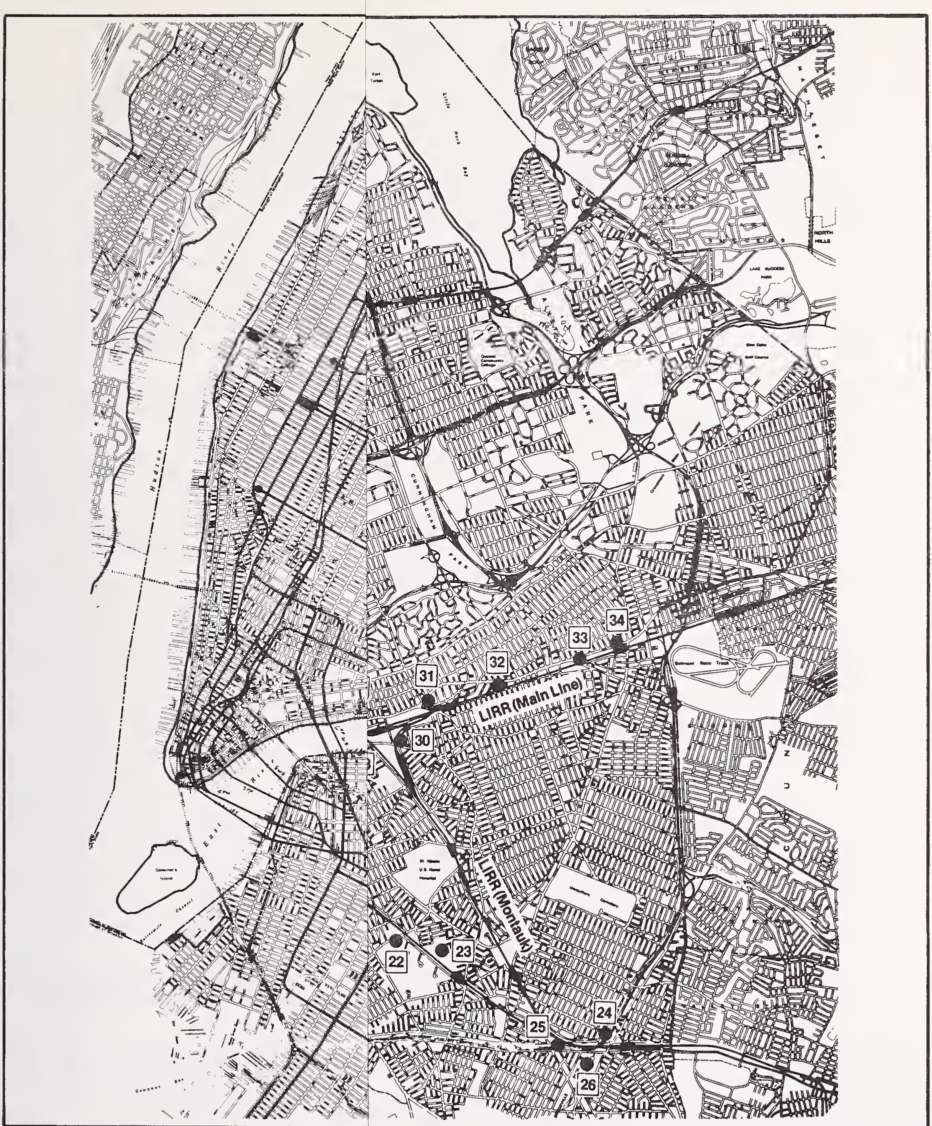
4. Woodside Memorial Park. This small park is one block from the Woodside Station on the proposed Queens Bypass Express line.

TABLE 3-16

PUBLIC PARKS AND RECREATIONAL FACILITIES

Map #	Name	Acreage	Address	Property: Plgd. Equip.	Property: Swim Pool	Property: Fields	Property: Courts	Park Dept. #	CD
1	Playground	1.1	28th St. & 40th Ave.	X				N.A.	1
2	McKenna Sq.	.01	Jackson Ave. & 45th St.					N.A.	2
	Capt. M. Rafferty Sq.	.001	44 Dr. & Hunter St.					Q36A	2
	Albert E. Short Sq.	.01	Jackson Ave. & 45th Rd.					Q72	2
	Patrick J. Gleason Sq.	.13	Jackson Ave. & 44th Cr.					Q191	2
	Court Square	.105	Jackson Ave. & Thompson Ave.					Q267	2
3	George F. Torsney Plgd.	2.0	Skillman Ave. & 43rd St.	x				Q340	2
4	Woodside Mem. Park	.02	Roosevelt Ave. & 60th St.					Q198	2
5	Park	.354	N/S Queens Blvd., W/S BQE					Q341c	2
	Park	.025	W/S BQE, 43rd Ave.					Q341B	2
	Park	.375	N/S Queens Blvd., E/S BQE					Q341D	2
6	Park	.323	51 Pl, 74 St., 51 Ave.					Q434	2
7	Park Strip	.207	Grand & Kneeland Aves.					Q151	4
8	Park Strip & Plgd.	1.6	84th St. & 57th Ave.					Q360	4
9	Joseph F. Mafera Park	5.4	65th Pl. & 68th Ave.	x		x	x	Q305	5
10	Glendale Plgd.	1.2	Central Ave. & 71st St.	x		x	x	Q290	5
11	JHS 119 Plgd.	1.4	78th Ave. & 74th St.	x			x	Q289	5
12	JHS 190 Plgd.	1.5	68th Ave. & Austin St.	x		x	x	Q335	6
13	Gerald McDonald Mem. Park	1.4	Queens & Yellowstone Blvds.					Q207	6
14	Park	.001	Woodhaven Blvd.					Q409	6
15	Little League Fields	5.5	Woodhaven Blvd.			x		N.A.	6
16	Forest Park	538	Myrtle Ave. Union Tpke.	x		x	x	Q15	9
17	Playground	4.4	95th Ave. & 127th St.	x		x	x	Q129	9
18	Howard von Dohlen Plgd.	1.4	Archer Ave. & 138th Pl.	x			x	Q105	12
19	King Park	11.5	Jamaica Ave. & 153rd St.				x	Q23	12
20	Marconi Memorial Field	4.6	109th Ave., 157th St.					Q127	12
21	P.S. 40 Plgd.	3.2	106th & Union Hall Sts.	x		x	x	Q301	12
22	P.S. 30 Plgd.	1.1	Baisley Blvd. & Bedell St.	x			x	Q426	12
23	Park	16.4	129th Ave. & 176th St.					Q412	12
24	Laurelton Parkway	59.6	Sunrise Hwy to Southern St Pkwy					Q27	13
25	Southern Parkway	202.6	Cross Bay Blvd to Brookville Blvd					Q96	13
26	Brookville Park	89.9	149th Ave. & 235th St.	x		x	x	Q8	13
27	Ashmead Pk./Grand Army Plz.	.27	Liberty Ave & 168th St.					Q3	12
28	Liberty Park	8.0	106th Ave. & 173rd St.	x	x	x	x	Q121	12
29	Playground	.6	179th Pl. & Jamaica Ave.	x			x	Q120	12
30	Park	2.9	183rd Pl. & Liberty Ave.					Q351	12
31	Hollis Veterans Mem. Sq.	.02	Jamaica & Hollis Aves.					Q245	12
32	Daniel A. Haggerty Park	4.3	Jamaica Ave. & 202nd St.	x		x	x	Q359	12
33	Litchhult Sq.	.074	Jamaica & Hempstead Aves.					N.A.	13
34	Queens Vil. Veterans Plz.	.32	Jamaica Ave. & Sprgfld. Blvd					Q47	13

Source: NYC Department of City Planning, Community Portfolio(s) 1978, updated with information from NYC Department of Parks and Recreation and field visits.



Legend

1 Playground

2 McKenna Square
Captain M. Rafferty Square
Albert E. Short Square
Patrick J. Gleason Square
Court Square

3 George F. Torsney Playground

4 Woodside Memorial Park

0 4000
Scale in Feet
N

PUBLIC PARKS AND RECREATIONAL FACILITIES

Figure 3-13

Legend

1	Playground	5	Parks	15	Little League Fields	25	Southern Parkway
2	McKenna Square Captain M. Rafferty Square Albert E. Short Square Patrick J. Gleason Square Court Square	6	Park	16	Forest Park	26	Brookville Park
3	George F. Torsney Playground	7	Park Strip	17	Playground	27	Ashmead Park and Grand Army Plaza
4	Woodside Memorial Park	8	Park Strip and Playground	18	Howard von Dohlen Playground	28	Liberty Park
		9	Joseph F. Mafera Park	19	King Park	29	Playground
		10	Glendale Playground	20	Marconi Memorial Field	30	Park
		11	JHS 119 Playground	21	P.S. 40 Playground	31	Hollis Veterans Memorial Square
		12	JHS 190 Playground	22	P.S. 30 Playground	32	Daniel A. Haggerty Park
		13	Gerald McDonald Memorial Park	23	Park	33	Litchhult Square
		14	Park	24	Laurelton Parkway	34	Queens Village Veterans Plaza

0 4000 Scale in Feet N

PUBLIC PARKS AND RECREATIONAL FACILITIES Figure 3-13

Queens Subway Options Study

TABLE 3-16

5. Parks. These small parks are adjacent to the Brooklyn-Queens Expressway. The quarter-acre park (Park Dept. No. Q341C also known as Block 1343, Lot 78) is a small local park with benches, a sand pit and game tables. Just before the LIRR crosses the BQE in Woodside, the most southerly track passes within 15 feet of the quarter-acre park. The retaining wall which now supports a portion of the LIRR embankment also acts as the dividing line between the existing railroad right-of-way and the park's property line. Patronage of this park is minimal because of difficulty of reaching it due to the LIRR on the north side, the adjacent expressway on the east side and Queens Boulevard on the south side of the park. Another park is located within 600 feet and is readily accessible to users of the affected park.

6. Park. This small facility is on the south side of the Main Line and immediately adjacent to the right-of-way.

7. Park Strip. This small park is on the north side of the Main Line and is not immediately adjacent to the right-of-way.

8. Park Strip and Playground. This park land is along the Long Island Expressway and adjacent to the LIRR Main Line.

9. Joseph F. Mafera Park. This park is heavily developed and well used, as was observed on two weekday afternoon visits. The long, narrow park is generally divided into three areas of activity. At the north end of the park and immediately adjacent to the Montauk alignment is a grass playfield for baseball and football. There is no fence between the park and the railroad right-of-way. In the middle of the park are paved play areas with basketball courts, and at the far end, furthest from the alignment, is a playground and sitting area for small children, toddlers and the elderly.

10. Glendale Playground. This playground, which contains benches, trees and a paved play area, is about a block from the Montauk alignment.

11. J.H.S. 119 Playground. This playground has large trees, basketball courts and playground equipment. Cooper Avenue and part of a block are between it and the alignment.

12. J.H.S. 190 Playground. This playground is separated from the Queens Bypass Express route under Yellowstone Boulevard by the junior high school.

13. Gerald McDonald Memorial Park. This park is a well used facility with trees and benches along Queens Boulevard. The park has recently undergone a major rehabilitation.

14. Park. This very small piece of park property is totally occupied by a pedestrian ramp which goes up to Woodhaven Boulevard and looks quite unused.

15. Little League Fields. These ballfields, maintained by Ridgewood-Glendale-Middle Village Little League are on property owned by the City of New York. The two baseball fields which look very well maintained are joined by a concession stand/field house.

16. Forest Park. As one of the last mature forests in the City, Forest Park is truly a unique open space resource. (See Ecosystems section for more discussion). In addition to the woodlands it contains, the park also includes a variety of active recreational facilities: an 18-hole golf course with a golf house, 12 tennis courts, a bandstand, numerous playgrounds and a running track. Most of these active recreational facilities are located in the western end of the park, west of the now inactive Rockaway Beach Division Line of the LIRR. Most of the area of the park through which the Montauk Line runs is undeveloped, except for a system of bridle paths. The closest facility to the alignment is a community playground, located next to Interborough Parkway, some 400 feet from the Montauk Line. None of the officially designated bridle paths cross the alignment except on the same bridge that takes the park road called East Main Drive across the line.

17. Playground. This playground is separated from the Montauk Division Yards by Atlantic Avenue.

18. Howard von Dohlen Playground. This playground is separated from the Jamaica Yards by Archer Avenue.

19. King Park. This facility is a large park in Jamaica, two blocks north of the Main Line.

20. Marconi Memorial Field. This park, connected to P.S. 48, is one block from the Southern Division of the LIRR.

21. P.S. 40 Playground. This playground is one block from the Southern Division of the LIRR.

22. P.S. 30 Playground. This playground is separated from the Southern Division of the LIRR by Bedell Street.

23. Park. This large park is undeveloped and adjacent to the Southern Division, across from Rochdale Village.

24. Laurelton Parkway. This parkway property is under NYC Parks Department jurisdiction.

25. Southern Parkway. This parkway property is under NYC Parks Department jurisdiction.

26. Brookville Park. This park is separated from the Montauk alignment by the Southern Parkway and South Conduit Road.

27. Ashmead Park and Grand Army Plaza. This plaza is several blocks from the Main Line, east of Jamaica.

28. Liberty Park. This large park is two blocks from the Main Line, east of Jamaica.

29. Playground. This playground is two blocks from the Main Line, east of Jamaica.

30. Park. This park, south of the LIRR Main Line, is 300 feet from the alignment.

31. Hollis Veterans Memorial Square. This small square is one block from the Main Line.

32. Daniel A. Haggerty Park. This large park, immediately adjacent to the Main Line, contains a variety of active recreational facilities: a grass ballfield with lights, basketball courts and playground equipment. One visit on a weekday afternoon found the park to be well-used by small children and teenagers. The Main Line tracks are on an embankment above the level of the park. A well-maintained, 20 foot-high fence separates the park from the Line. The fence is placed partly up the embankment, so it is even more formidable as a barrier. The parks facilities generally are not well-maintained.

33. Litchhult Square. This small square is 200 feet from the Main Line.

34. Queens Village Veterans Plaza. This small park is in front of the existing Queens Village station.

3.10 Ecology Resources

3.10.1 Potentially Sensitive Areas

Two Queens transit study corridors are identified where consideration of significant impact on ecology resources is appropriate -- the LIRR Main Line right-of-way and the LIRR Montauk Line right-of-way. Trackside areas along the south side of the Main Line could be affected by construction of additional tracks as proposed under the Queens Bypass alternative. No expansion of the right-of-way is proposed under the two Montauk alternatives but increased train traffic along these lines could have potential impacts on Forest Park. This 508-acre mature natural forest represents one of New York City's most remarkable open space resources.

3.10.2 LIRR Main Line Right-of-way

The LIRR Main Line stems from the Sunnyside Yards in Long Island City and commences easterly through the Woodside area. It is primarily above grade for approximately 4,000 feet until passing under Woodside Avenue where it enters a deep cut. The line is bridged over Queens Boulevard, extending along a filled segment with additional street overpasses. The line enters a slight cut north of the Long Island Expressway, then bridges the Expressway, and stays slightly above grade until entering a deep cut on the southwestern side in Rego Park. The line is on fill or bridge structure through Forest Hills where the proposed Queens Bypass route will connect in tunnel with the Queens Boulevard subway line at 71st/Continental Avenues.

None of the areas traversed contain wetlands. With the exception of a small adjacent one-acre park bounded by 51st Road and 74th Street the Main Line does not traverse or border any park lands. All of the trackside areas are heavily disturbed from initial construction, right-of-way maintenance and the accumulation of debris. All vegetation is confined to hardy urban species. A listing of the predominant woody plant species found is shown in Table 3-17 in approximate order of frequency. Many existing plants show signs of previous trimming. The vegetation is characteristically found in stands with many individuals of the same species covering as much as several hundred square feet. The diversity of plant species through these areas is limited and there are no clear differences in vegetation character on either side of the tracks. Virtually all vegetation is shrubby with only occasional individuals reaching heights of over 25 feet. No individual specimen quality trees were found on the right-of-way.

Observed animal species along the Main Line include only birdlife: sparrows, robins, mourning doves, woodpeckers and pigeons. While no terrestrial species were observed, a variety of urban adapted species might utilize the area when complete leafout provides necessary cover. Very little nesting was observed, and there is very limited evidence of past use of the area for nesting. Since the right-of-way margin varied in width from 10 to 25 feet and adjacent areas were urbanized right to the fence line, the value of these areas as habitat for avian nesting is limited. Consistent with this is the fact that in two areas where there is some amount of adjacent open land (at the 51st Road park and in the vicinity of the abandoned spur to the Main Line in Rego Park) a significantly greater amount of bird life was observed. It can be concluded that most trackside areas provide insufficient territory for most bird species to utilize as primary range, although some plant species such as sumac may provide seasonal feed.

TABLE 3-17

LIRR MAIN LINE
REPRESENTATIVE LIST OF WOODY PLANT SPECIES

Common Name	Botanical Name
Tree of Heaven	Ailanthus altissima
Choke Cherry	Prunus virginiana
Sumac	Rhus typhina or Rhus glabra
Black Birch	Betula lenta
Gray Birch	Betula populifolia
Pin Oak	Quercus palustris
Honeysuckle	Lonicera spc.

3.10.3 LIRR Montauk Line Right-of-Way

No physical widening of the Montauk Line right-of-way is contemplated under either of the Montauk alternatives. The primary area of concern in evaluating potential impacts is that segment of the rail line which passes through Forest Park, one of the region's premier environmental resources. This one-mile segment of the rail line extends through the Park from Union Turnpike, the northern boundary of the Park, to Park Lane on the south. The total area of Forest Park is 508 acres of which approximately 330 acres are principally natural forest. The remaining acreage contains a golf course and picnic and recreation areas.

Within Forest Park, the railroad right-of-way is close to level grade while the surrounding park areas vary in elevation from 10 feet above to 20 feet below the railroad grade. The fenceline is breached in many areas. The areas bordering the rail line are used primarily for recreation including walking trails and bridle paths. These areas are lightly used in comparison to other developed sections of the Park. This area of Forest Park is on sandy clay soil with a heavy accumulation of surface organic matter. It contains no wetlands. The forest composition is typical of a dry upland site. It is a mature climax forest dominated by species of oak and hickory. It is diverse and generally healthy. The individual trees are generally mature to over mature. The trees are not well maintained from an aborist's viewpoint. Numerous fallen trees and dead limbs have accumulated. Standing trees exhibit trunk hollows. These are somewhat beneficial from an overall ecological standpoint in that they provide certain types of habitat niches for such species as squirrels which over-winter in tree trunk cavities. The forest has very limited understory vegetation because of the dense high crown cover. Vegetation along the railroad cut is similar to that found in other trackside areas. However, there is considerable colonization and in-growth from the surrounding undisturbed areas. A listing of the predominant plant species found in a general order of dominance is shown in Table 3-18.

More than fifty species of birds are known to frequent Forest Park. Eastern and accipiter hawks have been observed in the tops of the tallest trees. In the canopies of trees of intermediate height are blue jays, mourning doves and woodpeckers. In the lower treetops, shaded by the taller trees, are sparrows and chickadees. Other birds that have been sighted are yellow-bellied sapsuckers, the great crested flycatcher, Acadian flycatchers, tree swallows, white breasted nuthatch, ruby crowned kinglet, cardinals, warblers and vireos.

Squirrels make up the Park's principal terrestial animal population. Other species which probably can be found include rats, mice and such tree dwelling species as flying squirrels and raccoons.

While the area of the Park (vicinity of LIRR ROW) is not intensively used, the area shows numerous signs of human occupancy. This includes past fire sites, and abundant debris ranging from broken glass to abandoned automobiles. This condition, combined with the lack of understory cover, make

TABLE 3-18
LIRR MONTAUK LINE
REPRESENTATIVE LIST OF WOODY PLANT SPECIES
FOREST PARK

Common Name	Botanical Name
Red Oak	Quercus borealis
Black Oak	Quercus velutina
White Oak	Quercus alba
Pignut Hickory	Carya glabra
Mockernut Hickory	Carya tomentosa
Shagbark Hickory	Carya ovata
Tree of Heaven	Ailanthus altissima
American Beech	Faqus grandifolia
Gray Birch	Betula populifolia
Black Birch	Betula lenta
Tulip Tree	Liriodendron tulipifera
Red Maple	Acer rubrum
Choke Cherry	Prunus virginiana
Flowering Dogwood	Cornus florida
Sumac	Rhus typhina or Rhus glabra
Highbush Cranberry	Viburnum lentago
Forsythia	Forshthia spc.
Raspberry	Rubus spc.
Rose	Rosa multiflora

substantial numbers of forest floor dwelling species of wildlife unlikely. There has been no record of animal strikes on the rail line, nor was there any evidence of animal scats, browse lines, or other indication of a forest species such as deer. Since there is neither abundant ground level food, nor readily available water, the area probabaly does not support major land animals in addition to birds or tree-living animals.

Inquiries to the City Parks Department, Commissioner of Parks office at Forest Park revealed no list of species or survey or inventory of the wildlife population. Further contact with the zoological staff at Flushing Meadow yielded no knowledge of major land animals in Forest Park and the opinion that because of its heavy use and its characteristics, the park would not support larger species than squirrels and raccoons.

West of Forest Park, the Montauk Line traverses residential, commercial and industrial areas with no adjacent areas of significant wildlife habitat. The only exception to this is the Lutheran Cemetery in Glendale. While it is adjacent to the track on the north side, it is an open lawn with only a narrow margin of woody vegetation separating it from the track. The rail line is entirely in commercial and industrial areas from the underpass at Metropolitan Avenue westerly to its termination at Sunnyside Yard.

3.11 Historic and Cultural Resources

3.11.1 Applicable Legal and Regulatory Requirements

Regulations developed under Section 106 of the National Historic Preservation Act of 1966 require that, prior to approval of Federal activities, agencies should take into account the effect of any undertaking on any district, site, building, structure, or object that is included or eligible for inclusion on the National Register of Historic Places. The regulations also require that agencies give the Advisory Council on Historic Preservation an opportunity to comment with regard to any such undertaking.

3.11.2 Description of Potentially Affected Sites

An inventory of historic sites along the various alignments which might be impacted by the alternatives was completed. The inventory includes sites listed on the National Register of Historic Places and those designated by the New York City Landmarks Commission. Sites which are listed in the files of the State Historic Preservation Officer are also included. These files contain various, miscellaneous surveys of historic sites which have been conducted in the borough. No comprehensive survey of the borough of Queens has been completed, so the listings of eligible properties cannot be considered complete. Table 3-19 lists the historic sites included in the inventory which are in the vicinity of the alignment, and Figure 3-14 locates the properties in relation to the alignments.

Following are brief site descriptions:

1. Brewster Building - Built in 1910, designed by Stephenson and Wheeler, this masonry building is the former home of a carriage manufacturer. The structure is included in a 1974 National Park Service historic sites survey.

2. New York and Queens County Warehouse - This 1885 Romanesque brick building is distinctive for its twin masonry towers. It was originally the main station for a street rail system. (National Park Service Survey of 1974.)

3. West Chemical Products, Inc. - This handsome 1890's brick building has housed a chemical factory since 1926. (National Park Service Survey of 1974.)

4. Returned Soldiers Monument - The Woodside Community Council erected this stone and bronze statue in 1923 as a memorial to soldiers who fought in World War I. Sculpted by Burt Johnson.

5. New York State Supreme Court - Dignified civic structure in neo-English Renaissance style, used by the Queens judicial system since 1908.

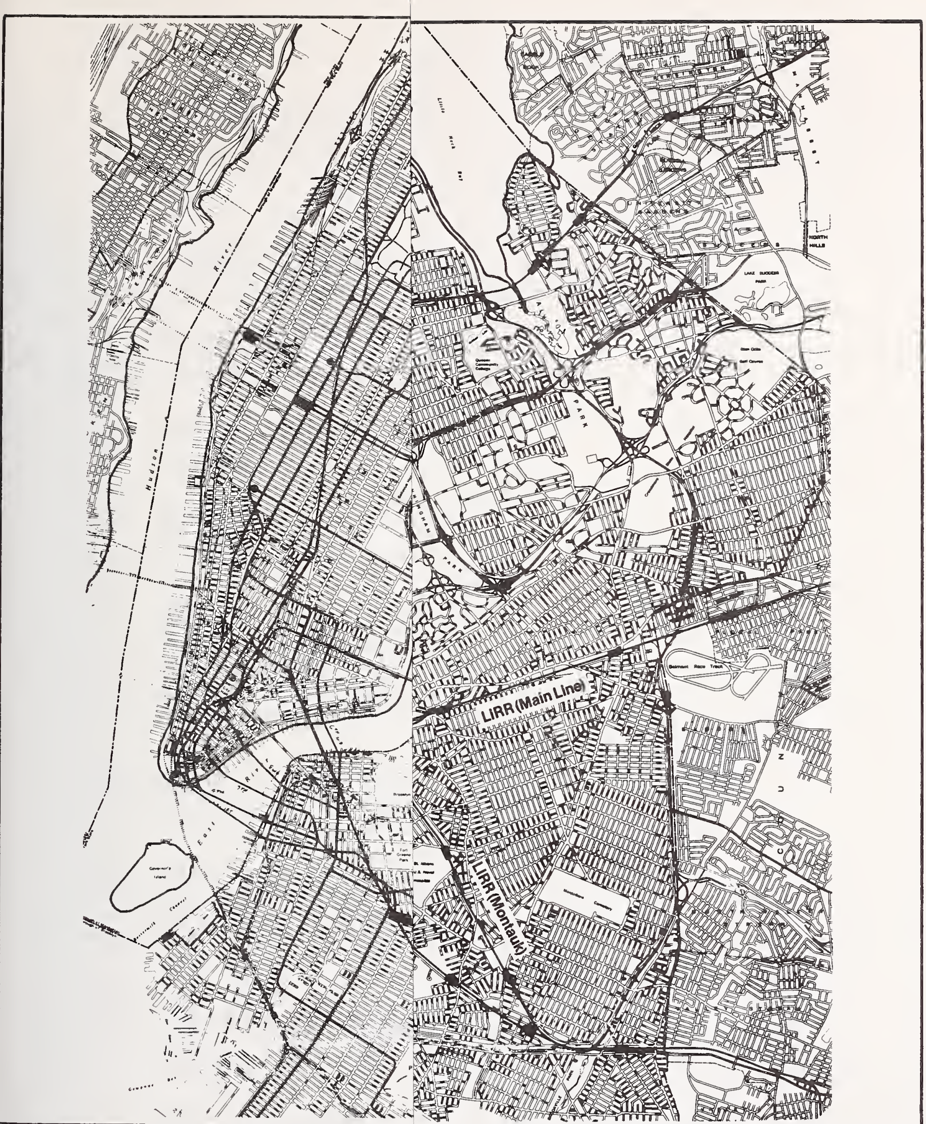
TABLE 3-19

HISTORIC PROPERTIES

Map #	Name	Address	City Landmark	National Register	Note 1	Note 2
1	Brewster Bldg.	27-01 Bridge Plaza N LIC			*	
2	NY & Queens Cnty Warehouse	Northern Blvd at Woodside Ave			*	
3	West Chemical Products Inc.	42-16 West St. LIC			*	
4	Returned Soldier Monument	Doughboy Park, Woodside			*	
5	NY State Supreme Court	25-10 Court Square	*			
6	Hunter's Point Hist. Dist.	45th Ave bet. 21 & 23 Sts. LIC	*	*		
7	Executone Bldg.	29-10 Thomson Ave. LIC			*	
	Bucilla Bldg.	30-20 Thomson Ave. LIC			*	
	American Chicle Factory	30-30 Thomson Ave. LIC			*	
8	Engine Co. 292	64-18 Queens Blvd. Woodside			*	
9	Fresh Pond - Traffic Hist. Dist.	Linden, Fresh Pond, Woodbine, Ridgewood		*		
10	Eng. Co. 291 Hook & Ladder 140	56-07 Metropolitan Ave. Ridgewood			*	
11	Ralph Bunche House	115-25 Grosvenor Road Kew Gardens, NY		*		
12	LIRR Roundhouse Complex	Atlantic Ave., Richmond Hill			*	
13	King Mansion	King Park, Jamaica	*	*		
14	Grace Episcopal Church & Graveyard	155-03 Jamaica Ave Jamaica	*			
15	First Reformed Church of Jamaica	153 Jamaica Ave, Jamaica		*		
	Sidewalk Clock	161-11 Jamaica Ave, Jamaica	*			
16	Jamaica Arts Center (former office of Register)	161-04 Jamaica Ave, Jamaica	*			
	Former J. Kurtz Sons Store Bldg.	162-24 Jamaica Ave, Jamaica	*			
17	Jamaica Savings Bank	161-02 Jamaica Ave, Jamaica				*
18	St. Monica's Church	94-20 160th St., Jamaica	*	*		
19	Prospect Cemetery	159th St. & Beaver Rd., Jamaica	*			

Note 1: Properties included in historical surveys found in files of state historic preservation office but with no official status.

Note 2: Properties nominated by the New York State Historic Preservation Office for listing on the National Register of Historic Places.



HISTORIC PROPERTIES Figure 3-14

Legend

1 ▽ Brewster Building
2 ▽ NY and Queens County Warehouse
3 ▽ West Chemical Products, Inc.
4 ▽ The Returned Soldier Monument
5 ○ N.Y. State Supreme Court

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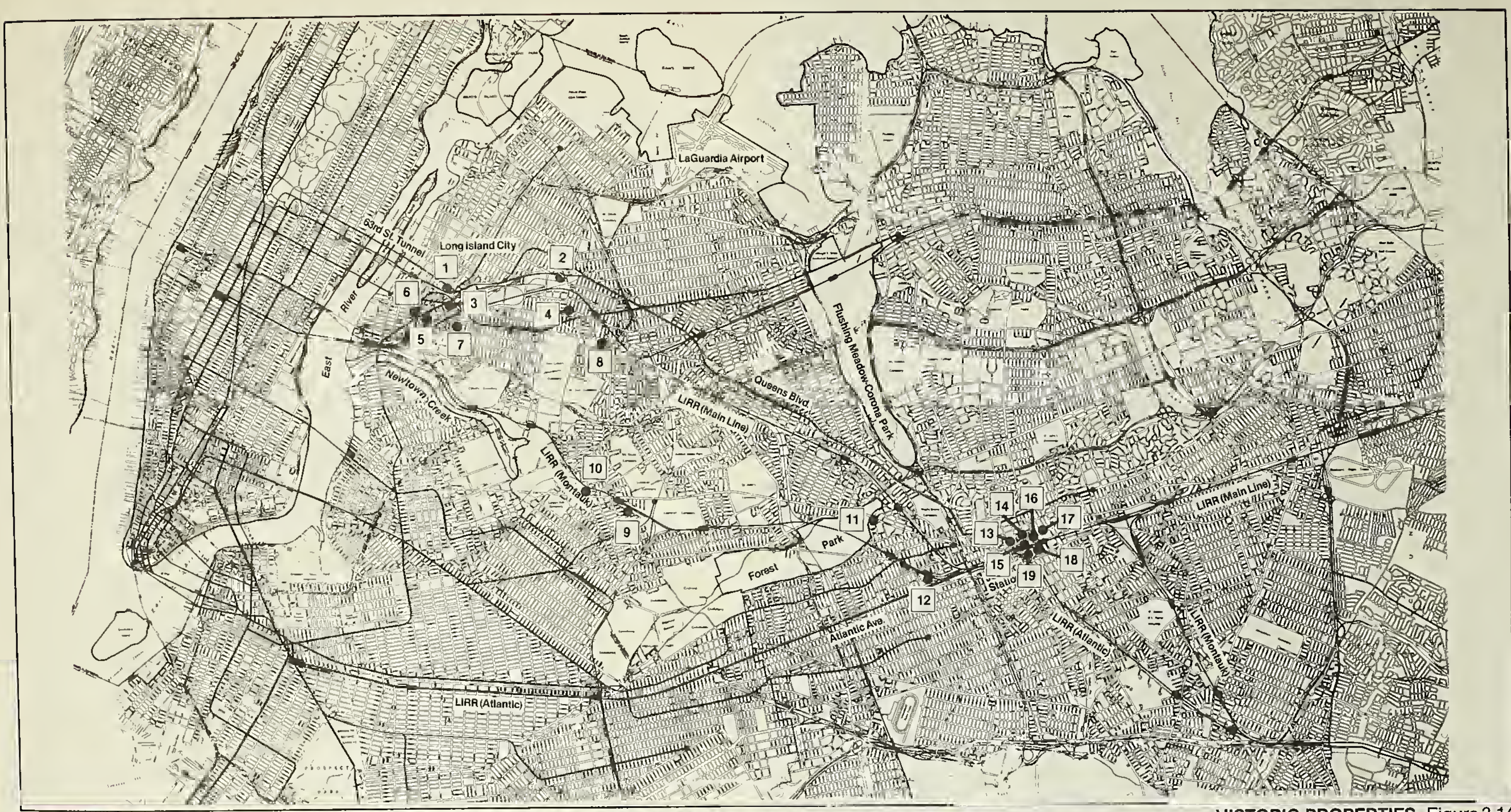


HISTORIC PROPERTIES Figure 3-14

Legend

1 ▽ Brewster Building
2 ▽ NY and Queens County Warehouse
3 ▽ West Chemical Products, Inc.
4 ▽ The Returned Soldier Monument
5 ○ N.Y. State Supreme Court
6 ○□ Hunter's Point Historic District
7 ▽ Executone Building
▽ Bucilla Building
▽ American Chicle Factory
8 ▽ Engine Company 292
9 □ Fresh Pond—Traffic Historic District
10 ▽ Engine Company 291
11 □ Ralph Bunche House
12 ▽ LIRR Roundhouse Complex
13 ○□ King Mansion
14 ○ Grace Episcopal Church and Graveyard
15 □ First Reformed Church of Jamaica
○ Sidewalk Clock
16 ○ Jamaica Arts Center (formerly Office of the Register)
○ Former J. Kurtz Sons Store building
17 ▼ Jamaica Savings Bank
18 ○□ St. Monica's Church
19 ○ Prospect Cemetery

○ City Landmark
□ National Register of Historic Places
▽ Note 1: Properties included in historical surveys found in files of New York State, Office of Parks, Recreation and Historic Preservation
▼ Note 2: Properties nominated by the state for listing on the National Register

0 6000
Scale in Feet
N

6. Hunter's Point Historic District - The district contains among the best preserved Italianate row houses in the city (built along 45th Avenue in the early 1870's). It also includes examples of French Second Empire neo-Grec and Queen Anne styles popular from 1870 to 1890.

7. Executone Building - 1913 white glazed terra cotta warehouse, designed by William Higginson. Originally the location of Sunshine Biscuits. (National Park Service Survey of 1974.)

   Bucilla Building - Designed by Maynicke and Francke, this eight-story concrete building was originally just seven stories. (National Parks Service Survey of 1974.)

   American Chicle Building - Completed in 1920 by Ballinger and Perrot in art deco style, it features glazed white bricks and is constructed of concrete. (National Parks Service Survey of 1974.)

8. Engine Co. 292 - Stone/brick structure erected in 1913. Designed by Dennison, Hirans, Darbyshire. (New York City Landmarks Preservation Commission survey of 1979.)

9. Fresh Pond-Traffic Historic District - One of the districts in the Ridgewood Multiple Resource Area, the district is roughly bounded by Linden Boulevard, Fresh Pond Road and Woodbine Street. This district includes 200 buildings designed by Louis Berger between 1915 and 1920. Homes on the eastern side of the district mostly feature flat facades, while those on the west feature angled facades.

10. Engine Co. 291 - Brick and concrete firehouse, 1912-14, designed by Morgan & Traisen. (New York City Landmarks Preservation Commission survey of 1979.)

11. Ralph Bunche House - Home of the highest ranking black person in the UN Secretariat and the first black recipient of the Nobel Peace Prize. Ralph Bunche was responsible for negotiating the Israeli-Arab armistice of 1949, and helped settle the Suez Canal Crisis of 1956.

12. Long Island Rail Road Roundhouse Complex - Dating from 1880 to 1900, the brick roundhouse complex includes repair shops, a paint shop, an electric shop, and a garage. (National Parks Service survey of 1974.)

13. King Mansion Museum - Country home of Rufus King, member of the Continental Congress and Ambassador to England. The house is Georgian in style with a Federal entrance door, with gracious proportions and a dignified appearance. Interiors display fine architectural detail of the Georgian and Federal periods. North section 1730; west section 1755; east section 1806. (New York City Landmarks Preservation Commission.)

14. Grace Episcopal Church and Graveyard - This handsome 1861 church with tall spire is built of rough-cut sandstone in the English Gothic tradition. Rufus King is buried in the courtyard.

15. First Reformed Church of Jamaica - Built in 1858-59 by master carpenter Sidney J. Loring and mason Anders Peterson. Fine examples of the Early Romanesque Revival Style. It is the third church on this site since the original Dutch Reformed Church of Jamaica was constructed in 1715.

    Sidewalk Clock - Example of an early twentieth century clock type that once proliferated in New York. Cast-iron workmanship with handsome, classically inspired design.

16. Jamaica Arts Center - Erected in 1898, the year Queens was incorporated into Greater New York. Renaissance revival style, designed by Queens architect A.S. MacGregor. Was once the Office of the Register, now preserved as the Arts Center.

    Former J. Kurtz Sons Store Building - Art Deco commercial building erected in 1931 for the furniture chain of J. Kurtz and Sons. The structure was used continuously by Kurtz until 1978 when it was sold to other retailers.

17. Jamaica Savings Bank - Designed by Hough & Derell in 1897 for the bank. Fine example of Beaux Arts style. The building and its tenant contributed to the 19th century commercial importance of Jamaica Avenue.

18. St. Monica's Church - Erected in 1856-7, one of the earliest surviving examples of Early Romanesque revival architecture in New York. One of the few Roman Catholic churches to be built in this style.

19. Prospect Cemetery - Established before 1668, this is the earliest cemetery in Queens. Many important Queens families are buried there, including the Sutphins and the Van Wyckes. A handsome Romanesque Revival chapel is the focal point of the cemetery.

4.0 TRANSPORTATION IMPACTS

This chapter presents a detailed analysis of the transportation impacts of the five alternatives. The chapter is divided into three sections reflecting the impacts of the alternatives on: 1) transit; 2) arterials and local streets; and 3) freight operations. The transit service section describes how the impacts of the alternatives compare as they affect quality of service, use of new facilities (63rd Street Tunnel), patronage and revenues. The traffic analysis reviews the impact on arterial and local streets resulting from alternative subway plans, grade crossing eliminations and construction. The freight operations section analyzes the impacts associated with combined passenger/freight service on the Montauk Branch under the Montauk Transfer (LIRR passenger service) or Montauk/Archer (NYCTA Subway service) alternatives.

4.1 Transit

A series of service and use measures were applied in analyzing the transit service characteristics of each alternative. These measures reflect the impact of the alternative in terms of relief from overcrowding, effective use of facilities (63rd Street Tunnel), and convenience of transit service--the primary goals of the study.

These evaluation measures and results are shown in Table 4-1 which uses the No Additional Construction alternative as a baseline with which the other alternatives are compared. Note that the variables for No Additional Construction are calculated assuming the scheduled 30 trains per peak hour. In fact, due to operating complexities and severe overcrowding this schedule is frequently not met.

This section also compares the alternatives in terms of reliability and flexibility, patronage and revenues.

4.1.1 Relief of Overcrowding

Relief of overcrowding, describes the extent to which the crowding of the Queens Boulevard Express services (E and F) is alleviated. The variables used to measure this are: the number of riders diverted from the 53rd Street Tunnel; passenger miles traveled above comfort and practical capacity; volume/capacity ratio for cars at the East River Tunnels; and passengers per car at the East River Tunnels. The 53rd Street Tunnel diversion indicates relief from overcrowding at the worst point in the Queens Boulevard line. Passenger miles traveled above comfort and practical capacity is a measure which indicates relief from overcrowding throughout the entire line. Volume/capacity ratios and passengers per car both show relief from overcrowding at all tunnel crossings.

4.1.1(a) 53rd Street Tunnel Diversion

Diverting riders from the Queens Boulevard line express services (E and F) through the 53rd Street Tunnel is a primary objective of the study. Table 4-2 displays the annual number of passengers crossing from Queens to Manhattan via the 53rd Street Tunnel under each alternative, and the corresponding number of

TABLE 4-1

SUMMARY OF EVALUATION MEASURES
[Annual Ridership, Peak Hour Capacity for the Year 2000]

Relief of Overcrowding	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
53 St. Tunnel Diversion (Millions of Riders/Year)	-	18.2	48.5	9.6	14.4
Passenger Miles Traveled Above Comfort Level (Millions)					
E,F Only	281.8	252.7	63.8	234.3	227.6
All Queens	429.4	420.8	335.8	370.0	364.9
Practical Capacity (Millions)					
E,F Only	76.0	54.1	4.8	67.4	63.5
All Queens	76.0	54.1	4.8	67.4	63.5
Volume/Capacity Per Car (Peak Hr.)					
63 Street Tunnel	0.02	0.78	0.80	0.49	0.61
60 Street Tunnel	0.82	0.69	0.70	0.78	0.75
53 Street Tunnel	1.12	0.93	0.91	1.02	0.97
42 Street Tunnel	0.81	0.81	0.78	0.81	0.78
Passengers per Car (Peak Hr.)					
63 Street Tunnel	4	172	175	109	135
60 Street Tunnel	180	151	155	172	165
53 Street Tunnel	246	204	201	224	213
42 Street Tunnel	113	113	109	113	110
Effective Use of Facilities					
63 St. Tunnel Ridership (Millions)	0.40	30.00	66.54	18.91	35.27
Tunnel Utilization (%, Peak Hr.)					
63 Street Tunnel	0.4	31.2	69.3	19.7	36.8
60 Street Tunnel	78.8	66.6	68.1	75.7	72.5
53 Street Tunnel	111.6	92.6	61.0	101.6	96.5
42 Street Tunnel	75.5	75.4	72.7	75.6	73.4
Convenience of Transit Service					
Passenger Minutes Saved					
Per Queens Trip	0	1.64	2.31	0.89	2.41
Total Queens Trips (Millions)	0	433.2	610.4	236.8	637.8
Transfers per Passenger	0.795	0.761	0.773	0.803	0.770
Additional Population Access	11,300	11,300	11,300	143,400	28,500
Additional Trains (Peak Hour)	8	12	16	12	18
Operating Statistics					
Incremental Car Miles, Annual (Existing = 266,800,000)	2,800,000	4,480,000	8,930,000	3,940,000	7,630,000
Incremental Train Hours, Annual (Existing = 1,907,031)	25,830	47,010	50,580	36,180	52,020

TABLE 4-2

ANNUAL QUEENS BOULEVARD LINE E AND F TRAIN RIDERSHIP AND DIVERSION
[Year 2000, In Millions]

	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
53 Street Tunnel Crossing Passengers	107.08	88.90	58.54	97.44	92.72
Passengers Diverted	-	18.18	48.54	9.64	14.36
% Passengers Diverted	-	17	45	9	13
Queens Plaza Passengers	105.08	83.99	56.54	95.45	90.54
Passengers Diverted	-	21.09	48.54	9.64	14.54
% Passengers Diverted	-	20	46	9	14
Roosevelt Ave. Passengers	107.63	92.90	53.27	95.63	93.81
Passengers Diverted	-	14.73	54.36	12.00	13.82
% Passengers Diverted	-	14	51	11	13
71-Continental Passengers	71.08	71.27	21.63	58.90	59.81
Passengers Diverted	-	(0.18)	49.45	12.18	11.27
% Passengers Diverted	-	0	70	17	16

TABLE 4-3

ANNUAL PASSENGER MILES TRAVELED ABOVE COMFORT AND PRACTICAL CAPACITY LEVELS
[In Millions of Passenger Miles]

Passenger Miles	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
Above Comfort Level[1]					
E, F Only	281.8	252.7	63.8	234.3	227.6
All Queens	429.4	420.8	335.8	370.0	364.9
Above UMTA Suggested Capacity[2]					
E, F Only	197.0	131.8	42.3	75.8	71.4
All Queens	208.6	143.4	104.9	87.3	82.8
Above Practical Capacity[3]					
E, F Only	76.0	54.1	4.8	67.4	63.5
All Queens	76.0	54.1	4.8	67.4	63.5
Total E, F	791.74	725.20	335.24	683.02	694.11
Total Queens[4]	1460.95	1451.85	1501.49	1534.39	1610.57

[1] Comfort is defined as fewer than 150 passengers per 75 foot IND car and fewer than 100 passengers per 52 foot IRT car.
[2] UMTA suggested capacity is defined as 2.7 square feet per standing passenger, an equivalent of 195 passengers per 75 foot IND car and 125 passengers per 52 foot IRT car.
[3] Practical capacity is defined as 220 passengers per 75 foot car and 140 passengers per 52 foot car.
[4] Includes Queens operation of the E, F, GG, N, RR, 7, K, B and QB services in the peak direction.

passengers diverted at Queens Plaza, Roosevelt Avenue and 71st-Continental Avenues.

Queens Bypass Express. This alternative diverts the largest number of Queens Boulevard line riders of any alternative. This is achieved by serving all Queens Boulevard and Archer Avenue Stations east of 71st-Continental Avenues with high frequency bypass service. In addition, the large diversion from the E and F trains is a result of decreasing the frequency (and thus increasing the waiting time) of those services. Because the Bypass Express route diverges from the Queens Boulevard line at 71st-Continental Avenues, virtually all diversion occurs east of that station.

Queens Boulevard Line Local Connection. This alternative diverts about 17 percent of the Queens Boulevard Express riders by providing increased local service to Manhattan via the 63rd Street Tunnel. The diversion of E and F train riders to Local Connection trains is significant between Roosevelt Avenue and Manhattan, the segment of the Queens Boulevard line with the most severe passenger crowding.

Montauk Transfer. This alternative diverts the fewest riders from the Queens Boulevard express services of the four build alternatives. Most of the passengers diverted under this alternative are E and F train riders who currently arrive at the subway using feeder bus service from Southeast Queens. The alternative offers no new rail service to the majority of Queens Boulevard line riders, those who walk to its stations and those who arrive by bus from the north.

Montauk/Archer. This alternative provides an express service to Manhattan from the Parsons-Archer Station which diverts riders from the four eastern Queens Boulevard line stations. It diverts few Queens Boulevard train riders west of the Montauk/Archer Richmond Hill station, but attracts riders from the J, M and LL services, which are currently not overloaded with passengers.

4.1.1(b) Passenger Miles Traveled Above Comfort

Lack of comfort due to overcrowding is indicated by two measures: passenger miles traveled in conditions above practical capacity of the cars; and passenger miles traveled in conditions which exceed comfortable levels ("above comfort"). For the 75-foot subway cars used on all services except the Flushing line, "practical capacity" is defined as 220 passengers per car, and "comfort" as 150 passengers per car. Practical capacity measures not simply comfort, but the passenger loadings at which subway doors often cannot close and delays ensue. This is a particular problem on the Queens Boulevard Express lines. The results for the five alternatives are displayed in Table 4-3.

No Additional Construction. This alternative does not relieve subway overcrowding in Queens. Travel above the practical capacity level occurs on the Queens Boulevard Express lines (E and F)between 71st-Continental Avenues and Manhattan. These passenger miles represent about 17 percent of the total for all Queens. The alternative includes extension of N service from 71st-Continental Avenues to 179th Street, providing more local service on the portion of the line already currently operating at comfort levels. No additional capacity is provided on the overcrowded portion of the Queens Boulevard lines, west of 71st-Continental. These lines feed the 53rd Street and 60th Street Tunnels which are currently saturated.

Queens Bypass Express. This alternative results in the largest drop in passenger miles traveled above practical capacity on the E and F lines. This is achieved by providing additional express service from stations west of 71st-Continental to Manhattan. Queens subway passenger miles traveled above the practical capacity are reduced to about one percent. The Bypass has the capacity to further reduce crowding by operating more than the 44 trains proposed in this alternative. However, 44 trains represent the best balance between anticipated volume and capacity.

Queens Boulevard Line Local Connection. This alternative reduces passenger miles traveled above practical capacity by diverting passengers from the over-crowded Queens Boulevard Express track (E and F lines) to more convenient and frequent local service to Manhattan. Additional system capacity is provided by the new trains using the 63rd Street Tunnel. Passenger miles above practical capacity are reduced to about 12 percent of the Queens total.

Montauk Transfer. This alternative reduces the passenger miles traveled above practical capacity to 14 percent. It draws passengers from eastern and southeastern Queens to Queens-oriented LIRR trains and the 63rd Street subway crossing, many of whom presently use feeder buses and the Queens Boulevard line express services (E and F lines). Compared to No Additional Construction, this alternative results in only a modest decrease in passenger miles above practical capacity.

Montauk/Archer. This alternative reduces passenger miles traveled above practical capacity to approximately 12 percent. It improves comfort by drawing passengers from the eastern portion of the Queens Boulevard Express line (E and F lines) and creating a completely new rapid transit corridor on the LIRR Montauk Branch. The new corridor diverts passengers from the J, M and LL trains, which are not overcrowded, as well as from the Queens Boulevard line.

In summary, only the Queens Bypass Express results in a major reduction in passenger miles above practical capacity. The two Montauk options divert most of their riders at the east end of the corridor and eliminate crowding east of Continental Avenue. Their impact is less significant than that of the Local Connection which diverts passengers west of Continental Avenue, the most crowded portion of the line.

4.1.1(c) Volume/Capacity per Car

To measure how effectively service is matched to ridership in each alternative, the practical capacity of the proposed trains is compared to projected morning peak hour ridership. The projected practical capacity of subway cars crossing the 53rd, 60th and 63rd Street Tunnels is estimated at 220 passengers each. For the smaller 42nd Street Tunnel IRT cars, the practical capacity is estimated at 140 passengers each. Table 4-4 shows the relationship between projected capacity and volume at the four East River Tunnel crossings and at three major station stops along each subway route. The table indicates the

TABLE 4-4

VOLUME VERSUS CAPACITY
[Year 2000 Peak Hour Ridership]

	No Additional Construction	Queens Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
63 ST. TUNNEL TRAINS:	8-B,K	12-B,K	26-B,K,N	12-B,K	18-B,QB,K
At Crossing: Riders[1]	180	16,500	36,600	10,400	19,400
Vol./Cap.	0.01	0.78	0.80	0.49	0.61
Roosevelt Ave. Vol./Cap.	-	0.60	-	-	-
Woodhaven Blvd. Vol./Cap.	-	0.59	-	-	-
71-Continental Vol./Cap.	-	0.13	0.75	-	-
60 ST. TUNNEL TRAINS:	29-N,RR	29-N,RR	29-QB,RR	29-N,RR	29-N,RR
At Crossing: Riders	41,600	35,200	36,000	40,000	38,300
Vol./Cap.	0.82	0.69	0.70	0.78	0.75
Queens Plaza Vol./Cap.	0.82	0.58	0.62	0.77	0.72
Roosevelt Ave. Vol./Cap.	0.38	0.20	0.59	0.52	0.25
71-Continental Vol./Cap.	0.11	0.00	0.00	0.11	0.00
53 ST. TUNNEL TRAINS:	30-E,F	30-E,F	20-E,F	30-E,F	30-E,F
At Crossing: Riders	58,900	48,900	32,200	53,600	51,000
Vol./Cap.	1.12	0.93	0.91	1.02	0.97
Queens Plaza Vol./Cap.	1.05	0.87	0.88	0.99	0.94
Roosevelt Ave. Vol./Cap.	1.12	0.97	0.84	1.00	0.98
71-Continental Vol./Cap.	0.74	0.74	0.34	0.61	0.62
42 ST. TUNNEL TRAINS:	29-#7	29-#7	29-#7	29-#7	29-#7
At Crossing: Riders	36,000	36,000	34,700	36,100	35,000
Vol./Cap.	0.81	0.81	0.78	0.81	0.78
Queensboro Plaza Vol./Cap.	0.73	0.73	0.70	0.72	0.72
74-Broadway Vol./Cap.	0.61	0.61	0.60	0.61	0.59

[1] East of Roosevelt Island

approximate locations at which each service's trains reach capacity loading. Another measure of volume vs. capacity, the average passengers per subway car, is shown in Table 4-5.

No Additional Construction. This alternative operates nearly empty cars at the 63rd Street crossing, which is served by eight trains. Along the N and RR lines, surplus capacity is reduced at stations close to the 60th Street crossing, but space does remain in trains. The same situation occurs on the 7 train as it nears the 42nd Street Tunnel. On the E and F trains, some space remains until the trains reach Roosevelt Avenue, after which ridership exceeds the practical capacity level.

Queens Bypass Express. This alternative allows the N train to cross the East River at 63rd Street along with the K and B services. This increases the volume and capacity at the crossing to 0.80, or 175 passengers per car, resulting in less unused space than under No Additional Construction. At the 60th Street crossing, excess capacity is greater than in No Additional Construction due to decreased passenger volume from the Queens Boulevard local line. Reduced E and F service lowers capacity but a decrease in ridership creates excess capacity throughout the line which is substantially greater than that of the other alternatives (V/C = 0.84). No change in service or capacity occurs for the 7 train, but decreased passenger volume provides more unused space than all other alternatives at both the Queensboro Plaza Station and the 42nd Street crossing.

Queens Boulevard Line Local Connection. This alternative increases subway service at the 63rd Street Tunnel by operating twelve peak hour trains with a volume capacity ratio of 0.78 or 172 passengers per car. The increased ridership in the 63rd Street Tunnel results in significant reductions in ridership at the 60th and 53rd Street Tunnels, where peak hour v/c ratios decline to 0.69 and 0.93, respectively. Along with the Queens Bypass alternative, this represents the greatest relief of overcrowding on the Queens Boulevard Express lines. Volume/capacity ratios at the 42nd Street Tunnel remain unchanged from No Additional Construction.

Montauk Transfer. This alternative directs riders using the LIRR Queens-oriented service to the K and B trains, which originate at Thomson Avenue. Volume for the 63rd Street crossing is higher than that of No Additional Construction but less than the other alternatives. Unused capacity, however, is greater than for the Bypass or Local Connection alternatives. Unused capacity is less at the other three crossings than in the other three "build" alternatives because of the Montauk Transfer's relative inability to divert existing western Queens riders from their current subway lines. The Transfer is the only alternative other than No Additional Construction which does not reduce the 53rd Street Tunnel volume below capacity (V/C = 1.02).

Montauk/Archer. This alternative uses the Montauk Branch and Cutoff to connect the Archer Avenue line with 63rd Street Tunnel. The increased service of the K, B and QB and strong ridership from eastern Queens combine to slightly decrease excess capacity through the 63rd Street crossing. At the 60th Street and 53rd Street crossings, unused capacity is greater than that of the base alternative and Montauk Transfer, but less than the Bypass and Local Connection alternatives. In this alternative, volume is slightly less than capacity at the 53rd Street Tunnel (V/C = 0.97).

TABLE 4-5

PASSENGERS PER CAR

[Year 2000 Peak Hour Ridership]

	No Additional Construction	Queens Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
63 St. Tunnel					
Trains[1]	B, K	B, K	B, K, N	B, K	B, K, QB
At Crossing	3	172	175	109	135
Roosevelt Ave.	-	133	-	-	-
Woodhaven Blvd.	-	131	-	-	-
71-Continental	-	28	166	-	-
60 St. Tunnel					
Trains[1]	N, RR	N, RR	RR, QB	N, RR	N, RR
At Crossing	180	151	155	172	165
Queens Plaza	181[3]	127[3]	137[4]	169[3]	158[3]
Roosevelt Ave.	83[3]	45[3]	65[4]	83[3]	56[3]
71-Continental	25[3]	0[3]	0[4]	25[3]	0[3]
53 St. Tunnel					
Trains[1]	E, RR	E, F	E, F	E, F	E, F
At Crossing	246	204	201	224	213
Queens Plaza	241	193	195	219	208
Roosevelt Ave.	247	213	184	219	215
71-Continental	163	165	75	85	137
42 St. Tunnel					
Trains[2]	#7	#7	#7	#7	#7
At Crossing	113	113	109	113	110
Queensboro Plaza	102	102	98	101	100
74-Broadway	86	85	84	85	83

[1] Practical capacity is 220 passengers per car
[2] Practical capacity is 140 passengers per car
[3] N train only
[4] QB train only

4.1.2 Effective Use of New Facilities (63rd Street Tunnel)

A primary goal of the study is the effective use of the facilities now under construction such as the 63rd Street Tunnel. This is measured by comparing the anticipated ridership of the 63rd Street Tunnel of each alternative.

Table 4-1 gives the utilization of each tunnel as a percentage of the practical capacity, assuming the maximum number of trains are run through each tunnel. The maximum number of trains per hour using each tunnel multiplied by the practical capacity of each train is the tunnel's practical capacity. The percentage of this capacity actually utilized under each alternative is an indication of how effectively facilities are being used and directly relates to passenger comfort.

Table 4-6 presents the number of riders who will use each route and tunnel. The particular route of each train is specified in Chapter 2.

Other new facilaities under construction are the Hillside Connector and Archer Avenue Subway. All of the options effectively utilize the Hillside Connector and the Archer Avenue subway by routing Queens Boulevard Express routes through them.

No Additional Construction. This alternative has virtually no ridership through the 63rd Street Tunnel. This is because the 63rd Street line's only Queens station, at 21st Street, is adjacent to stations serving the RR, E and F trains. Only a small group of potential riders, who live northwest of the 21st Street station, find that the B and K trains, which use the 63rd Street Tunnel route, provide the fastest journey to work.

Queens Bypass Express. This alternative routes all the bypass service to the 63rd Street Tunnel. These trains provide exceptionally fast service to Manhattan for Queens Boulevard line riders east of 71st-Continental Avenues. For this reason, 36,600 riders use the 63rd Street Tunnel in the peak hour, more than in any other alternative. This alternative provides the best ridership balance between the East River tunnels and maximizes 63rd Street Tunnel utilization at 69 percent.

Queens Boulevard Line Local Connection. This alternative provides local service on the Queens Boulevard line and attracts a substantial number of riders to the B and K trains which use the 63rd Street Tunnel. The frequent Local Connection service to Sixth Avenue in Manhattan attracts many riders from the local stations of the Queens Boulevard line, particularly between Roosevelt Avenue and 36th Street. This alternative makes extensive use of the 63rd Street Tunnel. However utilization cannot be maximized because the N train shares the Queens Boulevard local tracks with the B and K trains.

Montauk Transfer. This alternative uses the 63rd Street Tunnel for subway trains from the Thomson Transfer Station to Manhattan and has the lowest ridership, 10,400 riders in the peak hour, of the four build alternatives. Virtually all of the tunnel's ridership in this alternative is composed of passengers who use the LIRR Queens-oriented service. Few 63rd Street Tunnel riders board at the 21st Street station or use the free pedestrian connection from the Queens Boulevard line.

TABLE 4-6

ANNUAL QUEENS RAIL SERVICE BOARDINGS
[Year 2000 In Millions]

Train Service	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
B/K	0.40	50.36	26.72	18.91	26.36
E	50.54	47.81	27.82	45.81	48.72
F	67.63	56.18	40.54	60.36	57.45
GG	8.00	-	7.09	8.00	7.09
J	6.73	6.91	4.36	5.82	0.00
N	70.72	33.27	41.81	68.54	50.00
QB	-	-	43.81	-	9.27
63 Street Tunnel	0.40	30.00	66.54	18.91	35.27
60 Street Tunnel	75.62	63.99	65.45	72.72	69.63
53 Street Tunnel	107.08	88.90	58.54	97.44	92.72
QOS - Main Line	-	-	-	5.36	-
QOS - Atlantic Br.	-	-	-	8.24	-
Total QOS Passengers	-	-	-	13.60	-

Montauk/Archer. This alternative uses the 63rd Street Tunnel for Montauk Branch subway service to Sixth and Seventh Avenues in Manhattan. This alternative, which attracts riders from the eastern end of the E and F routes as well as from the slow and indirect J, M and LL routes, has the second highest 63rd Street Tunnel ridership.

4.1.3 Convenience of Transit Service

Convenience of transit service, evaluates the availability and directness of subway service to riders in Queens. The variables used to measure this are: passenger minutes saved per trip; average number of transfers per passenger; additional population with rail access to the proposed stations; number of additional peak hour Queens trains to Manhattan.

4.1.3(a) Passenger Minutes Saved

Travel time saved is an important indication of the improved quality of transit services. Travel time impacts (passenger minutes saved and door to door times) in the corridor are calculated for each of the fourteen Queens neighborhoods and for all of Queens. The results are presented in Tables 4-7 and 4-8, using No Additional Construction as a base.

No Additional Construction. Conditions under this alternative will be worse than those today. Crowding will be worse because ridership is expected to grow. Thus, delays in the future will be slightly worse than today.

Queens Bypass Express. Along with Montauk/Archer, this alternative results in the greatest saving in average travel time. The savings are 2.3 minutes per passenger for all Manhattan-bound peak hour trips originating in Queens. For some locations the savings exceed seven minutes per trip. The reduction in travel time reflects increased express service to Manhattan and reduced delays associated with overcrowding.

Queens Boulevard Line Local Connection. This alternative reduces travel time without providing additional express service by eliminating current delays to the E and F trains. Average travel time is reduced by 1.6 minutes per passenger; for riders most benefitting from improved travel times on the Queens Boulevard line, the saving is 4.6 minutes.

Montauk Transfer. This alternative results in the smallest travel time savings of the four build alternatives. Although similar to Montauk/Archer in that it provides a high speed service on the LIRR Montauk Branch, it carries only half as many riders. In addition, this alternative does not divert enough riders from the E and F trains to reduce the passenger load factor sufficiently to eliminate delays on the Queens Boulevard line.

Montauk/Archer. This alternative results in an average travel time reduction of 2.4 minutes per trip, and for some areas with new service, the savings are over nine minutes. These savings result from direct express service to Manattan from the Archer Avenue Subway and areas along with the LIRR Montauk Branch west of Jamaica and from reduced overcrowding delays on the Queens Boulevard line.

TABLE 4-7

AVERAGE TRIP TIMES

[Includes Only Manhattan-Bound Trips Originating in Queens for the Year 2000]

Queens Neighborhood (Millions of Annual Trips)	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
Astoria (27.56)	43.8	43.8	43.8	43.8	43.8
Long Island City (28.44)	37.8	37.8	37.8	37.8	37.8
Jackson Heights (24.98)	50.6	49.8	50.0	50.3	49.8
Flushing (25.14)	63.3	63.1	63.1	63.4	63.1
Woodside (21.90)	41.3	39.7	39.9	41.0	40.5
Forest Hills (48.30)	53.7	51.4	50.3	53.0	49.6
Jamaica Center (7.73)	63.7	59.3	56.9	61.4	57.0
Greater Ridgewood (13.49)	56.5	55.8	55.8	56.3	52.2
Woodhaven (12.48)	61.2	59.3	58.2	58.2	52.2
Fresh Meadows (11.71)	68.8	64.1	61.8	66.3	59.4
Bayside (11.21)	76.9	75.7	75.0	76.5	75.0
Queens Village (10.30)	83.9	79.2	76.8	79.1	78.3
Jamaica (12.20)	74.1	69.5	67.0	71.1	68.9
Laurelton, Rosedale (9.00)	80.4	78.2	77.2	75.3	78.3
Total Study Area (264.44)					
Total PMT[1] (Billions)	14.817	14.384	14.207	14.580	14.179
PMT Savings[2] (Millions)	-	433.2	610.4	236.8	637.8
Average Trip Time	56.03	54.39	53.72	55.14	53.62

[1] Billions of annual passenger minutes of travel per one-way trip
[2] Millions of annual passenger minutes of travel saved. Uses No Additional Construction as Base.

TABLE 4-8

DOOR-TO-DOOR TRAVEL TIMES
FOR SELECTED DESTINATIONS IN MANHATTAN

[Year 2000 Morning Peak Hour in Minutes, Includes Delays]

	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
Merrick & Springfield Blvds. (St. Albans)					
To 57th/6th	67.0	61.6	51.5	49.0	46.8
To 57th/Lexington	64.3	59.1	54.0	54.0	54.5
To World Trade Ctr.	77.0	71.8	69.5	65.5	66.5
Ascan Ave. & Austin St. (Forest Hills)					
To 57th/6th	41.7	36.1	28.0	37.2	34.0
To 57th/Lexington	39.0	33.8	32.0	36.5	33.3
To World Trade Ctr.	53.0	46.8	44.0	49.5	46.3
Liberty Ave. & 160 St. (Jamaica)					
To 57th/6th	49.2	44.0	40.1	44.7	36.5
To 57th/Lexington	46.5	41.3	36.8	44.0	40.5
To World Trade Ctr.	59.5	53.3	49.8	57.0	54.0
Jamaica Ave. & 104 St. (Woodhaven)					
To 57th/6th	52.2	47.0	41.5	31.5	31.5
To 57th/Lexington	49.5	44.3	45.0	36.5	33.5
To World Trade Ctr.	49.0	49.0	48.5	47.0	45.0
Fresh Pond Rd. & Eliot Ave. (Ridgewood)					
To 57th/6th	39.2	35.0	39.2	39.2	24.5
To 57th/Lexington	36.7	36.7	36.7	36.7	26.5
To World Trade Ctr.	46.0	46.0	46.0	46.0	38.0

4.1.3(b) Transfers per Passenger

The number of transfers required by passengers traveling to Manhattan from Brooklyn and Queens is an indication of convenience and directness of service. Transfers between different modes of travel and between different services within a single mode are included in this variable. The number of transfers is not a perfect measure of convenience, as some transfers are made not for convenience, but to save time. For example, transferring from a local service to a parallel express service. The time savings factor explains why the Local Connection has so few transfers and the Bypass, so many. Table 4-9 shows the number of transfers, and transfers per passenger for each alternative.

No Additional Construction. This alternative has the second highest number of transfers among the five alternatives. This is primarily due to the fact that it has the highest Queens Boulevard line GG service ridership and those riders must transfer at Queens Plaza to reach their Manhattan destinations. In addition, the alternative offers no new routes to Manhattan which substantially improve the directness of service for Queens riders.

Queens Bypass Express. This alternative has the third highest number of transfers among the five alternatives. Although the heavily-traveled Bypass route has direct service from both 179th Street and Parsons-Archer Stations, many passengers ride the E and F trains to 71st-Continental Avenues and transfer there to trains using the Bypass. The Bypass Express alternative also has substantial GG ridership on the Queens Boulevard line local track, and these Manhattan-bound riders must transfer at Queens Plaza.

Queens Boulevard Line Local Connection. This alternative has the least number of transfers because its convenient service to Sixth Avenue destinations encourages riders to remain on local trains rather than transferring to the express. In addition, Queens Boulevard transfer movements from the GG are eliminated.

Montauk Transfer. This alternative has the most transfers of all the alternatives, because most LIRR Queens-oriented service riders make two transfers, one from feeder bus to the LIRR and the other from the LIRR to subway service. At present, most residents of eastern and southeastern Queens bound for Manhattan make only one transfer, from feeder bus to the Queens Boulevard line subway.

Montauk/Archer. This alternative has the second lowest number of transfers. In the peak period, subway services operate to both Sixth Avenue and Broadway-Seventh Avenue on the Montauk Branch, reducing the need for transfers. In addition, many Montauk/Archer riders bound for Midtown Manhattan currently use the J, M and LL trains and transfer in Manhattan for uptown subway services.

4.1.3(c) Additional Direct Rail Access

At present, some 1,126,900 Queens residents or approximately 60 percent of the 1,891,300 Queens residents live within walking distance of rail transit service. A Queens resident was considered to have direct walking access to transit service if he or she lives within 0.8 miles of a rail transit station.

TABLE 4-9

ANNUAL PASSENGER TRANSFERS[1]
[Year 2000, In Millions]

Number of Passengers Making:	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
No Transfers	195.80	211.07	208.52	194.71	212.89
Percent of Total	34.4	37.3	36.4	34.3	37.2
1 Transfer	295.61	278.88	286.88	290.88	277.25
Percent of Total	51.8	49.3	50.0	51.2	48.5
2 Transfers	78.72	76.00	78.17	82.54	81.45
Percent of Total	13.8	13.4	13.6	14.5	14.3
Average Transfers[2] per Passenger	0.795	0.761	0.773	0.803	0.770

[1] Includes all intermodal and intramodal transfers from Brooklyn and Queens.

[2] Number of passengers making 3 or 4 transfers is negligible.

(Walking distance is measured as 0.8 miles; this is the point at which half of those who live/work within that distance would choose to walk. The estimate is based on analyses of several studies of walk habits calibrated for Queens. Among those studies is the 1979 Citywide Origin Destination Survey.) To the extent that an alternative includes stations which increase the population with direct access (direct population coveage), it represents a measure of service improvement. The impact of each alternative on the direct rail access of the Queens population is shown in Table 4-10 and discussed below.

No Additional Construction. This alternative increases the direct population coverage of Queens subway service by about one percent, or 11,300 potential riders. The alternative includes four new Queens stations, at 21st Street (Long Island City), Jamaica-Van Wyck, Sutphin-Archer and Parsons-Archer. These stations would be constructed under all of the five alternatives. Only the two Archer Avenue stations in Jamaica would increase geographic coverage. The other two are located near existing subway lines: the Jamaica-Van Wyck Station is near the Jamaica Avenue Elevated's Metropolitan Avenue Station; and the 21st Street station serves an area with numerous Long Island City stations.

Queens Bypass Express. In addition to the four new stations included in all five alternatives, the Queens Bypass Express includes new stations at Northern Boulevard and Woodside. Because of their locations, these stations add no additional population coverage: the Northern Boulevard Station site is near the existing Astoria line, 39th Avenue stations and the IND Queens Plaza Station; the Woodside Station site is adjacent to the Flushing line 61st Street Station.

Queens Boulevard Line Local Connection. This alternative includes only those new stations that are part of No Additional Construction. Thus, the increase in coverage is the same as No Additional Construction -- approximately 11,300 people.

Montauk Transfer. This alternative provides new high-frequency rail transit service to five LIRR stations in eastern and southeastern Queens --Hollis, Queens Village, Rosedale, Laurelton, and Locust Manor. Under this alternative, LIRR Queens-oriented service (QOS) trains from those stations and from Jamaica and Richmond Hill would travel to a new Thomson Avenue Station, the transfer location for subway service to Manhattan. This service would give approximately 143,400 Queens residents direct access to high-frequency rail transit. This increase in geographic coverage is more than five times greater than the other four alternatives. The Richmond Hill Station provides no new geographic coverage because it is adjacent to the 111th Street Jamaica Avenue Elevated Station; nor does the Thomson Avenue Station which is near a number of existing subway stations in Long Island City.

Montauk/Archer. This alternative extends geographic coverage to the area along the LIRR Montauk Branch with new rapid transit stations at Fresh Pond Road, Woodhaven Boulevard and Richmond Hill. These stations are located south of the Queens Boulevard line and north of the BMT J, M and LL train routes. Unlike any of the other alternatives, Montauk/Archer includes rail transit cutbacks and the loss of direct rail access to approximately 12,500 Queens residents. This loss is due to the termination of the Jamaica Avenue Elevated at Crescent Street and the elimination of the line between 121st Street and Cypress Hills. The net increase in the Queens population with direct access to rail transit is 28,500.

TABLE 4-10

QUEENS POPULATION WITH DIRECT RAIL ACCESS

	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
Existing Stations	1,126,900	1,126,900	1,126,900	1,126,900	1,126,900
Jamaica-Van Wyck	0	0	0	0	400
Sutphin-Archer	3,500	3,500	3,500	3,500	3,500
Parsons-Archer	7,800	7,800	7,800	7,800	7,800
21 St. LIC	0	0	0	0	0
Northern Blvd.	--	--	0	--	--
Woodside	--	--	0	--	--
Thomson Ave.	--	--	--	0	0
Fresh Pond Rd.	--	--	--	--	8,800
Woodhaven Blvd.	--	--	--	--	12,200
Richmond Hill	--	--	--	0	8,300
Rosedale	--	--	--	19,800	--
Laurelton	--	--	--	19,400	--
Locust Manor	--	--	--	31,300	--
Queens Village	--	--	--	31,300	--
Hollis	--	--	--	30,300	--
Total Gain	11,300	11,300	11,300	143,400	41,000
J-Line (Loss)	0	0	0	0	(12,500)[1]
Net Access Gain	11,300	11,300	11,300	143,400	28,500
Total Access	1,138,200	1,138,200	1,138,200	1,270,300	1,155,400

Passengers without access to other stations once the Jamaica Elevated Queens Blvd., Metropolitan Ave., 121 St., 111 St., 102 St., Woodhaven, Forest Pkwy., Elderts La. and Cypress Hills stations are closed.

4.1.3(d) Additional Trains

Another indication of the ability of the alternatives to relieve overcrowding is the number of additional trains, car miles and train hours each provides.

No Additional Construction. This alternative increases the number of trains to Manhattan by eight in the peak hour. The current number of E and F trains (30) and N trains (14) to Manhattan on the Queens Boulevard line would remain unchanged. The eight additional trains from the 21st Street terminal consist of five B trains that operate via Manhattan's Sixth Avenue to Brooklyn and three K trains that also operate via 6th Avenue but terminate at the Second Avenue station in Manhattan.

Queens Bypass Express. This alternative adds a total of 26 B/K and N trains in the peak hour. These trains are local east of 71st-Continental and are express west of 71st-Continental using the Bypass to Manhattan. This alternative reduces present peak hour E and F train services from 15 to 10 trains each west of 71st-Continental. (In the other alternatives this service would not be reduced.) Thus, the net increase in peak-hour trains to Manhattan is 16. West of 71st-Continental, local service is provided by GG trains to Brooklyn, and 14 peak-hour QB trains (replacing existing Queens Boulevard N Service) to Manhattan per hour.

Queens Boulevard Line Local Connection. This alternative adds twelve peak hour B/K trains to Manhattan via the Queens Boulevard line local track and the 63rd Street Tunnel. This is four more trains than are operated under No Additional Construction. The GG service to and from Brooklyn terminates at Court Square to permit the intensified B/K operation.

Montauk Transfer. The B service has the same service frequencies as in the No Additional Construction alternative -- five trains per hour --but is extended to Thomson Avenue Station which serves as the Queens terminal for passengers transferring from Queens-oriented service (QOS) trains. The K service, also operating to Thomson Avenue, is increased from three to seven trains in the peak hour. This alternative includes 12 new peak hour trains to Manhattan. LIRR Queens-oriented trains from Rosedale and Queens Village, which direct passengers to the 63rd Street Tunnel, would run at a rate of five trains per hour during rush hours and would cease operation between 10:30 PM and 5:30 AM.

Montauk/Archer. Service to the three stations along the Montauk Branch to Parsons-Archer is provided by a total of 12 B and K trains and by six QB trains in the peak hour. This alternative has the greatest number of new trains to Manhattan -- 18 in the peak hour, with the QB operating only in the peak hour. J train service is cut back to Crescent Street without changing its frequency. Transit service on the Montauk Branch east of Thomson Avenue ceases between 10:30 PM and 5:30 AM.

4.1.4 Reliability and Flexibility

The success of any alternative depends not only on the increased service it provides, but on its ability to deliver that service reliably as well as have the flexibility to deliver alternate service when necessary.

4.1.4(a) Operational Reliability

Reliability measures the ability of each alternative to provide on-time service. There are two key factors which determine the reliability of each alternative: operational complexity (sequences of trains merging on a single track, turnbacks at terminals and crossovers), and crowding at stations. Table 4-11 presents the merging and crossover moves for each alternative and weights them by the number of trains involved.

Queens Bypass Express. This alternative has the most reliable service of the alternatives being considered for two reasons. First, this alternative includes a relatively simple operation at 71st-Continental Avenues since the Bypass route will diverge from the Queens Boulevard line before the E and F trains merge or the Jamaica Yard trains are put in. Secondly, the Bypass operation benefits from the substantial reduction in passenger crowding on the Queens Boulevard line. The Bypass is a slightly more complex operation than the Local Connection discussed below, because of the greater number of trains being operated, and because it utilizes the Parsons-Archer terminal to capacity.

Queens Boulevard Line Local Connection. This alternative ranks second to the Bypass for reliable service. It is slightly more complex than the present operation east of 71st-Continental Avenues, because under this alternative there are 29 trains merging onto the local tracks at 71st-Continental Avenues. As shown in Table 4-7, 17 N and JFK trains merge with 12 K trains there. There are 20 local trains at present, 14 N and 6 GG. Overall, the Local Connection exhibits one of the simplest operations of the five alternatives. This alternative has the second largest diversion measure, taking almost 20 percent of the riders off the E and F trains.

Montauk/Archer. This alternative has the next most reliable service after the Local Connection and the Bypass. It is a comparatively complex operation, having the largest number of additional trains to Manhattan and operating the Parsons-Archer lower level terminal near capacity. The operation at 71st-Continental Avenue is simpler because it avoids the conflicts that presently occur when GG trains from the Jamaica yard merge with the N trains coming from 179th Street. However, its diversion capability does reduce overcrowding on the Queens Boulevard Express lines to a manageable level.

Montauk Transfer. No Additional Construction and the Montauk Transfer alternative are less reliable than the other alternatives. The Montauk Transfer has a less complex subway operation. It is almost as simple as No Additional Construction except for the greater number of trains operating. However, this alternative introduces two additional terminals -- one for the subway, one for the LIRR -- at the transfer station. This alternative also depends on timely operation of the Queens-oriented LIRR trains.

Some delays are inherent in the LIRR component of the Montauk Transfer alternative because the lines go through Jamaica Station. Improvements to Jamaica Station, including flyovers at the east and west ends, will permit the additional traffic to operate and increase flexibility at the station. Nevertheless, Jamaica will remain a major hub where trains meet for passenger transfers. In addition, some delays will occur at the Thomson Avenue Transfer Station,

TABLE 4-11

RELIABILITY - PEAK HOUR OPERATIONAL COMPLEXITY

Subway Merges	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
Van Wyck	13 E & 13 F	13 E & 13 F	8 E & 10 F	13 E & 13 F	13 E & 13 F
			12 B,K & 14 N		
71-Contintental	4 E,F & 26 E,F	4 E,F & 26 E,F	18 E,F & 2 E	4 E,F & 26 E,F	4 E,F & 26 E,F
	14 N & 6 GG	17 N,JFK & 12 K		14 N & 6 GG	14 N, 6 GG
Northern Blvd.	---	---	3 JFK & 26 B,K,N	---	---
Thomson Ave.	---	---	---	---	3 JFK & 18 B,K,QB
Subtotal Merge[1]	360	425	409	360	444
Subway Turnarounds					
179 Street: Upper	13 F	13 F	10 F	13 F	13 F
Lower	14 N	12 B, K	14 N	14 N	14 N
Parsons-Archer: Upper	13 E	13 E	20 E,B,K	13 E	13 E
Lower	12 J	12 J	12 J	12 J	18 B,K,QB
Crescent St.	---	---	---	---	12 J
Jamaica Yard Leads	10 E,F,GG	21 E,F,JFK,N	22 E,GG,QB	10 E,F,GG	10 E,F,GG
Court Square	---	6 GG	---	---	---
21 St. (LIC) Pocket	11 JFK,B,K	---	---	---	---
Thomson Ave.	---	---	---	15 JFK,B,K	---
Subtotal Turnaround[1]	136	143	179	159	168
Subway Complexity	496	568	588	519	612
LIRR Merges, Turnarounds					
Thomson Avenue	---	---	---	10 QOS	---
Queens Village: Merges	---	---	---	5 QOS & 5 LIRR	---
Turns	---	---	---	5 QOS	---
Valley Stream: Merges	---	---	---	5 QOS & 5 LIRR	
Turns	---	---	---	5 QOS	---
Jamaica Track 4	---	---	---	[illegible] QOS, LIRR	---
Jay Tower	---	---	---	10 QOS	---
Subtotal LIRR[1]	---	---	---	108	---
Total Complexity	496	568	588	627	612

[1] Calculated as the number of trains per hour multiplied by 1 for 1-6 tph, 2 for 7-12 tph, 3 for 13-18 tph, 4 for 19-24 tph and 5 for 25-30 tph. The weighting factor is halved for four-track terminals (179 Street and Jamaica Yard).

Queens Village and Valley Stream, where trains reverse directions. The Queens Village, terminal was designed for flexibility by providing two holding tracks for delayed trains. Only one track is available at Valley Stream.

The highly complex nature of the Subway/LIRR-Montauk Transfer operations could result in some degree of unreliability in making schedule. It will, however, increase throughput of the Queens Boulevard line from which it will divert riders.

No Additional Construction. This alternative will be a relatively unreliable operation. It offers no diversion from an already overcrowded line. Thus, future subway train operations east of 71st-Continental Avenues will be similar to those of today, but with worsened passenger crowding conditions. It is unlikely that system throughput will rise above its current level of 26 trains per hour. Although in the past 30 trains per hour were run on this line, the introduction of the R-46 cars has decreased the rate at which passengers can board trains. Although these cars are 25 percent longer than their predecessors (75 feet versus 60 feet) they have the same four doors per car. The present eight-car trains have only 32 doors per train, as opposed to 40 doors on the earlier ten-car trains.

4.1.4(b) Operational Flexibility

The ability of an alternative to maintain service during emergencies by rerouting trains is indicative of its operational flexibility. For each alternative, passenger and train rerouting capabilities were examined for service outages along different track sections. The results are displayed in Table 4-12.

The track sections examined were selected because they contain either a put-in station (adding a train to service along the route), a merge or rerouting through crossovers at either end. The Queens Boulevard sections examined are 179th Street to Van Wyck; Parsons-Archer to Van Wyck; Parsons-Archer to the Jamaica Elevated, and the 63rd, 60th and 53rd Street Tunnels.

No Additional Construction. This alternative is the least flexible alternative. The 63rd Street Tunnel does not increase operational flexibility because it cannot be reached from any other line. Neither passengers nor trains can be rerouted to it. In the event that the 53rd Street Tunnel is closed, no express trains could be rerouted to the Queens Boulevard line via another tunnel. The Archer Avenue subway does increase flexibility by enabling trains to 179th Street to be rerouted to Parsons-Archer and vice versa. This flexibility is common to all alternatives.

Queens Bypass Express. This alternative is the most flexible, providing more excess capacity for rerouting trains than the other alternatives. It is the only alternative which can fill all East River Tunnels to capacity. If either the Bypass or the 63rd Street Tunnel were blocked, the Queens Boulevard lines have the capacity to carry some of the trains that would ordinarily use the Bypass. In this scenario, the tunnel capacities would be the limiting factor and the resulting service would be the same as at present. Since the Queens Bypass and the current Queens Boulevard lines closely parallel each other, such rerouting would not greatly inconvenience riders.

TABLE 4-12

FLEXIBILITY FOR ALTERNATE TRAIN ROUTES

[In Trains Per Peak Hour]

Location of Track Outage	Rerouting Capability by Alternative: No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
179 to Van Wyck: Local Track	4 N to Queens Blvd. express track	4 N to Queens Blvd. express track	12 N to Queens Blvd. express track	4 N to Queens Blvd. express track	4 N to Queens Blvd. express track
	7 N to Archer Ave.	7 N to Archer Ave.	0 to Archer Ave.	7 N to Archer Ave.	7 N to Archer Ave.
Parsons-Archer (Upper Level) to Van Wyck	16 E to Queens Blvd. local or express track	18 E to Queens Blvd. local or express track	20 B, K, E to Queens Blvd. express track; 16 B, K, E to local track	16 E to Queens Blvd. local or express track	16 E to Queens Blvd. local or express track
Parsons-Archer (Lower Level)	12 J turned at 111 St.	12 J turned at 111 St.	12 J turned at 111 St.	12 J turned at 111 St.	None J trains unaffected.
63 St. Tunnel	None	None	10 N, B, or K to 53 St. Tunnel; 1 to 60 St. Tunnel	None	None
60 St. Tunnel	None	15 N to 63 St. Tunnel and Queens Blvd. local track	1 QB to 63 St. Tunnel to Bypass	None	None
53 St. Tunnel	None	1 F to 63 St. Tunnel and Queens Blvd. local track	1 F to 63 St. Tunnel to Bypass.	15 F to 63 St. Tunnel to Thomson Ave.	9 F to 63 St. Tunnel to Montauk Branch
Montauk Branch	--	--	--	LIRR Main Line track[1]	None
Queens Bypass	--	--	10 F to Queens Blvd. express track, 1 N to local track	--	--

[1] Capacity for rerouted trains in the year 2000 depends upon final signaling configuration of the Main Line and East River Tunnels.

Queens Boulevard Line Local Connection. This alternative ranks second lowest in flexibility among the five alternatives. The connection to the 63rd Street Tunnel allows Queens Boulevard local trains to use either the 60th Street or 63rd Street Tunnels. During the peak hour, the 60th Street Tunnel and 53rd Street Tunnel are used to capacity. Although trains could be rerouted to the 63rd Street Tunnel from either Sixth Avenue or Broadway, there are constraints in service flexibility. The almost saturated use of the local line by B/K and N trains, limits the available excess capacity to one F train to Queens Boulevard via the 63rd Street Tunnel if the 53rd Street Tunnel is closed.

It should be noted that the capacity to divert service in an emergency is not limited to the level of excess capacity in the tunnel. In fact, rapid transit will cut back scheduled train service in the open tunnel to enable trains to be rerouted from the blocked or closed tunnel. For example, under the Local Connection, when the 53rd Street Tunnel is closed, scheduled service in the 63rd Street Tunnel would be reduced to accommodate diverted F's, with diverted E's routed through the 60th Street Tunnel.

Montauk Transfer. This alternative does not increase routing flexibility for the subways, since it does not connect the 63rd Street Tunnel to any of the Queens Boulevard tracks. Fifteen Queens Boulevard express trains from Manhattan could be rerouted to the Thomson Avenue station if the 53rd Street Tunnel were closed. From there, riders could transfer to QOS trains to reach their destinations in Jamaica or southeastern Queens. The Montauk Transfer is more flexible than Montauk/Archer because the LIRR QOS trains could be sent directly to Penn Station if the 63rd Street Tunnel is closed. Present LIRR plans for reverse signaling between Jamaica and Penn Station, and proposed station improvements at Jamaica permit this rerouting. The addition of another LIRR terminal at Thomson Avenue enhances flexibility, since trains could be rerouted to the transfer station. For examples, trains normally destined for Penn Station could be operated to Thomson Avenue under adverse conditions. However, it should be noted that ridership capacity of the QOS trains is less than that of the other build alternatives.

Montauk/Archer. This alternative does not have an alternate routing in the event that it is closed. However, it does offer more capacity to carry passengers to Manhattan if the 60th Street Tunnel is unavailable than any alternative except the Queens Bypass. This would not be a direct route for Queens Boulevard riders west of Jamaica. If the 53rd Street Tunnel is closed nine F trains from Manhattan could be rerouted to the 63rd Street Tunnel and the Montauk/Archer line. In addition to taking a rerouted F train passengers could take any of the services that normally use the Montauk Branch to reach their destinations in the eastern part of Queens.

4.1.4(c) Maintenance of Service

This measure indicates the degree to which an alternative permits existing service to be sustained during the construction period.

No Additional Construction. This alternative includes the completion of the 63rd Street Tunnel to 21st Street and the connection of the Archer Avenue line to the Jamaica Avenue Elevated and Queens Boulevard lines. The construction of these lines is nearing completion and service disruptions to subway service have already been endured.

Queens Bypass Express. The construction of this alternative will cause the most disruption to rail service because of impacts on the LIRR Main Line. Construction will require tunneling under the Queens Boulevard line, and connection of the Bypass to the Queens Boulevard local tracks east of 71st-Continental Avenues and to the 63rd Street Tunnel. This will cause disruptions in the affected areas similar to those occurring at Queens Plaza and the Astoria line under the Local Connection alternative. In addition, construction beneath and along the LIRR Main Line will cause continual service disruptions. Five bridges along the LIRR need to be lengthened and 18 bridge superstructures will be added to accommodate the subway tracks. While work is being done adjacent to the south side LIRR local tracks, eastbound trains must be rerouted to the eastbound express tracks (Main Line 2) to provide adequate worker protection. Bypass express construction will be limited to the 9:30 AM to 3:30 PM period on weekdays so that the LIRR has use of all four Main Line tracks during the morning and evening rush hours.

Queens Boulevard Line Local Connection. This alternative ties the 63rd Street Tunnel to the Queens Boulevard local lines between Queens Plaza and 36th Street. Off-peak GG, F and RR service will be disrupted in this alternative. The connection for the westbound tracks involves breaking through the existing Queens Boulevard line sidewall. During late evening and early morning hours when this work is being done, Queens Boulevard local trains will be rerouted to the express track around the breakthrough area. Connecting the eastbound tracks is more difficult. A shielded tunnel will be constructed under the four existing tracks. Until the tunnel is lined, about nine months from the start of tunneling, trains will pass over the tunnel at reduced speed to minimize vibration and settlement. During the time the eastbound sidewall is being demolished, local trains will be rerouted around the construction areas. The physical connection between the existing and new tracks can be made over a weekend. The Astoria line will also experience service disruptions because the columns supporting this line must be underpinned where the new tunnel passes under them. Astoria line RR trains will proceed at reduced speeds, and service may be altogether stopped for a few evening hours as the underpinning is done.

Montauk Transfer. This alternative will cause less subway service disruptions than the Local Connection and the Queens Bypass Express. Extending the 63rd Street Tunnel line from 21st Street to Thomson Avenue in Long Island City will require underpinning of the Astoria line with the same resulting service disruption as in the Queens Bypass and Local Connection alternatives. The Queens Boulevard line will also experience service delays, as the tunnel construction requires slower speeds on the express and local lines. The Montauk Transfer construction also disrupts LIRR Montauk Branch operations. Reconstruction and electrification will take place on a single track while the other track is used for LIRR freight and passenger equipment moves. Adequate right-of-way clearance exists in most locations for construction equipment; however, construction in Forest Park requires shutdown of both Montauk Branch tracks during the midday period. This does not significantly affect LIRR operations, because no revenue passenger trains operate during the period and nonrevenue trains can be rerouted via the railroad's Main Line.

Montauk/Archer. This alternative has the same subway service impacts as the Transfer alternative. In addition, the Montauk Branch connection to the Jamaica Avenue Elevated requires the complete shutdown of the J train. The service will terminate at Crescent Street, the terminal when Montauk/Archer trains are operational. Free transfer substitute bus service will be provided when construction of the connection begins. LIRR service impacts are similar to those of the Montauk Transfer alternative.

4.1.4(d) Travel Flexibility

Travel flexibility describes the number of direct Manhattan bound services provided by an alternative. The more services a rider can take directly to a destination without transferring, the better the travel flexibility of that alternative. The number of direct services to Manhattan available from existing and proposed Queens Boulevard and Montauk Branch Stations is shown in Table 4-13.

No Additional Construction. This is the least flexible of the alternatives. Since the 63rd Street Tunnel is not connected to any other Queens subway line it cannot provide new services to passengers currently using the 60th, 53rd and 42nd Street Tunnel crossings. These Tunnels are used very nearly to capacity, which precludes the operation of any new services.

Queens Bypass Express. This alternative offers the greatest travel flexibility. With the extension of B and K service to the Parsons-Archer station, a rider at the Union Turnpike station has four services available with direct access to Manhattan. At 71st-Continental Avenue this increases to five services with the QB service put-in trains. A consequence of trains using the Bypass is the increase in travel flexibility for riders at the Woodside and Northern Boulevard Stations, which they would not have otherwise. The proposed pedestrian connection between the Northern Boulevard and Queens Plaza Stations will also increase this alternative's flexibility.

Queens Boulevard Line Local Connection. This alternative is more flexible than No Additional Construction. Connecting the 63rd Street Tunnel to the Queens Boulevard local line and turning the GG service back to Brooklyn at Court Square allow for more direct service to midtown and lower Manhattan. Travel flexibility is increased for stations between 71st-Continental Avenue and 36th Street. This is a result of extending the B and K service route from 21st Street in Long Island City to 179th Street.

Montauk Transfer. This alternative is virtually identical to the No Additional Construction alternative in terms of direct service to Manhattan. However, it should be rated as more flexible than No Additional Construction because the alternate service provided to southeastern Queens by the QOS trains will give an additional 143,400 people access to the transit system. This is approximately thirteen times the number of people who gain access to the transit system in the No Additional Construction, Local Connection and Queens Bypass Express alternatives.

Montauk/Archer. This alternative provides greater flexibility to the population east of Van Wyck by offering new service to Manhattan via and Seventh Avenues. Since the new service utilizes the Montauk Branch of the LIRR west of

TABLE 4-13

DIRECT SERVICES AVAILABLE FROM QUEENS STATIONS TO MANHATTAN[1]

[Morning Peak Period]

Existing Stations	No Additional Construction	Qns. Blvd. Line Local Connection	Queens Bypass Express	Subway/LIRR Montauk Transfer	Montauk/Archer Ave. Subway Connection
179 Street	2	2	2	2	2
Parsons Blvd.	2	2	2	2	2
Union Turnpike	3	3	4	3	3
71-Continental	3	4	5	3	3
Roosevelt Ave.	4	5	4	4	4
Queens Plaza	3	3	5[2]	4[2]	5[2]
New Stations					
Parsons-Archer and Sutphin-Archer	2	2	3	2	3
Jamaica-Van Wyck	1	1	2	1	1
Richmond Hill, Woodhaven Blvd. and Fresh Pond Rd.	-	-	-	-	2
Woodside	1	1	3	1	1
21 Street-LIC	1	1	2	1	2

[1] Excludes premium-fare JFK service.
[2] Includes those Northern Blvd. and Thomson Ave. station services accessible via a pedestrian connection.

Jamaica, it is not accessible to most Queens Boulevard line riders and therefore provides no additional flexibility west of Van Wyck and is therefore considered less flexible overall than the other build alternatives.

4.1.5 Patronage

Patronage estimates for this study required the examination of all transit services affected by the five alternatives. The services considered include the entire LIRR system and all subway lines operated in Brooklyn and Queens. The subway routes operated on the four Queens East River crossings (42nd, 53rd, 60th and 63rd), the two northernmost crossings in Brooklyn (14th Street and Williamsburg Bridge), and the GG crosstown route which operates along the Queens Boulevard line and serves as a feeder to other subway routes were examined in detail. Inclusion of the LL, J and M routes in the current study reflects the potential diversion of residents in the northern tier of Brooklyn under certain alternatives. It should be recognized that the other subway lines to the south were also examined but to a lesser extent.

Year 2000 peak hour inbound volumes for each tunnel crossing and for the LIRR are presented in Table 4-14. From the table it is apparent that service changes in Queens affect ridership in Brooklyn. However, the impact is small at crossings south of the Williamsburg Bridge. For analysis of ridership and revenue, only the 14th Street and Williamsburg Bridge crossings in Brooklyn are included. All of the LIRR system is included in the analysis since ridership to all terminals is affected to some extent by certain alternatives. Corridor service is thus defined as Queens and Northern Brooklyn subway service, all LIRR service, and surface transit operating in Queens.

A common ridership base and a fixed trip table is used for subsequent revenue calculations. This is justified by the extremely high transit usage: 81 percent of Queens-Manhattan peak hour trips are made by transit, thus total ridership is primarily a function of general social and economic conditions and not of variations between services. It is assumed that the total number of transit riders is the same in all alternatives, but that ridership shifts occur amont lines and modes reflecting the quality and cost of the services offered by each alternative.

Of the five alternatives considered, the Subway/LIRR Montauk Transfer is the only option which involves special fare assumptions. Evaluation of the other alternatives is based on the prevailing fare structure of the NYCTA and LIRR fares. In order to assess the significance of fare levels in developing the travel demand forecasts, analysis was made for a range of possible fare levels. The range reflects the projected mode of access (walk to subway or bus to subway) and pricing assumptions:

Low -	\$0.90 - \$1.80
Medium -	\$2.20 - \$2.80
High -	\$2.80 - \$3.70

The analysis concluded that fares did affect ridership, but that increases due to lower fares and deceases due to higher fares were not significant. Therefore, the midrange fare levels were used for the ridership estimates and opera-

TABLE 4-14

ESTIMATED YEAR 2000 PEAK HOUR INBOUND RIDERSHIP[1]

Mode	No Additional Construction	Local Connection	Queens Bypass	Subway/ LIRR Transfer	Montauk/ Archer
Subway: Queens					
63rd Street	220	16,461	36,574	10,501	19,428
60th Street	21,429	20,600	20,600	21,061	20,629
53rd Street	58,916	48,913	32,195	53,621	50,970
42nd Street	36,022	35,988	34,727	36,111	35,017
	134,829	134,567	137,590	128,030	141,768
N. Brooklyn[2]					
14th Street	11,506	11,696	11,489	11,490	10,637
Williams	18,111	18,131	16,750	17,596	13,414
	30,016	30,298	28,367	29,446	24,051
LIRR: Hunterspoint	1,974	1,974	1,858	2,418	2,158
Woodside	81	81	128	81	81
Long Island City	199	199	199	0	0
Flatbush	7,215	7,223	6,532	7,288	6,724
Penn Station	49,530	49,502	49,170	46,674	49,062
	58,999	58,979	57,887	56,461	58,025
Montauk Transfer[3]	0	0	0	9,907	0
Total	223,844	223,844	223,844	223,844	223,844

1 The peak hour ridership numbers have been adjusted to eliminate transfers between the LIRR and Subway at the Woodside Avenue and Hunterspoint Avenue Station and to reflect the fixed-trip table.

2 Includes some trips using other crossings to maintain common ridership base.

3 Transfers not counted in subway total to avoid double counting in trip table since there is a unified fare.

tions analysis developed for the DEIS. A detailed description of the fare sensitivity analysis is presented in Appendix A.12.

Every alternative attracts subway riders from the Northern Brooklyn crossings to Queens crossings. However, among the five alternatives, the Local Connection attracts the fewest Brooklyn riders, and the Montauk Archer attracts the most. Diversion from LIRR to the various alternatives is similar: there is little impact for No Additional Construction or the Local Connection. There is substantial diversion for the Montauk Transfer Option.

For the subway and bus modes, the base is the 1983 ridership. The LIRR base is projected year 2000 riders. This is because the LIRR Capital Improvements Program is making a number of changes to enable the ridership increase. Since those costs are not included in this study, neither are the corresponding revenues. The base is used to calculate incremental ridership and revenues. Table 4-15 shows annual ridership estimates for each of the five alternatives and a base.

Surface transit has been added to the analysis of annual ridership. The treatment of surface transit in this study has been limited to feeder bus service in Queens whose ridership is tied directly to subway ridership. Alternatives that increase subway ridership also increase feeder bus ridership. Although improvements in station coverage tend to decrease feeder bus ridership as riders shift from bus to walk access. This is particularly evident in the Montauk/ Archer alternative which has significantly improved station coverage. The Montauk Transfer alternative also decreases feeder bus ridership considerably.

Note that the ridership totals count transit passengers each time they use a different service. A rider using a feeder bus and subway is counted twice. The reductions in the annual ridership totals for the Subway/LIRR Transfer and Montauk/Archer alternatives reflect this system of counting, representing a decrease in feeder bus ridership, rather than a decrease in ridership. Another factor is the reduced ridership totals are the projected reductions in off-peak usage of LIRR service in the Montauk Transfer alternative.

The major modes of access to subway stations derived from the 1979 Citywide Origin-Destination Study, were: 57 percent walk access, 31 percent feeder bus access and 12 percent auto access. Most auto access is drop-off, not parkers. None of the alternatives will substantially affect access except those which include the opening of or improvement of feeder bus service.

4.1.6 Revenue

Estimates of revenue result directly from ridership estimates through the application of average fares. Revenue differences among alternatives may occur due to a number of reasons. Some variation in revenue and ridership occurs as transit riders shift modes (i.e., commuter rail to subway), which are expanded to annual ridership using factors which vary slightly with each mode. The primary sources of revenue variation, though, occur due to variations in fares among alternatives, and diversions to or from feeder bus access.

TABLE 4-15

ESTIMATED ANNUAL YEAR 2000 RIDERSHIP SHIFTS BY MODE*

Ridership (000)

Mode	Base[1]	No Additional Construction	Local Connection	Queens Bypass	Subway/ LIRR Transfer	Montauk/ Archer
Subway	291,389	+14,017	+14,107	+15,725	+511	+14,652
LIRR	84,099	+169	+140	-1,419	-3,456	-1,222
Montauk Transfer (2)	0	0	0	0	+13,606	0
Surface:						
NYCTA	58,250	+2,056	+2,075	+3,061	-3,093	+1,820
Private	69,676	+1,682	+1,684	+1,794	+1,410	+284

*The changes shown represent riders shifting between modes and do not represent a change in total year 2000 ridership.

(1) Base is 1983 annual ridership except for LIRR. LIRR base is projected year 2000 riders because LIRR Capital Improvements Program enables this growth to occur, the CIP is not included in QSOS costs.

(2) Montauk Transfer ridership is to Thomson Avenue. Riders not included in subway totals due to unified fare.

Table 4-16 lists the estimated annual revenues for each alternative as well as a "base" that was derived from the corridor area defined for ridership estimation. Revenue for the base is derived from estimated year 2000 fares which allow for about 50 percent real growth. Revenues are presented in 1983 dollars. Fare increases for current riders are not credited to the alternatives. These fare increases generate about $237 million which may be used for other capital maintenance programs. Fare increases associated with the new riders, approximately 18,000 trips per year, are credited to each alternative.

The smallest revenue producer is the Montauk/Archer alternative. This is because opening new stations reduces feeder bus ridership and the express service from Jamaica diverts riders from the LIRR. Subway fares are much lower than railroad fares.

The Queens Bypass generates the second lowest revenue. The express service from Parsons/Archer diverts even more LIRR riders than the Montauk/Archer alternative. However, because there are no new stations, there is no loss in feeder bus revenues.

Ignoring surface transit revenue gains or losses does not affect the ranking of each alternative by revenue. However, it does considerably reduce the magnitude of the differences in revenue among some of the alternatives, especially the Queens Bypass and Montauk/Archer alternatives.

The Montauk Transfer is the best revenue generator. About 13.6 million trips per year are diverted from the subway and other LIRR trains to the LIRR Queens-oriented services. The combined Queens-oriented train fare is $2.20 per trip including subway transfer and $2.80 including a feeder bus transfer. This upgrading of service from the subway accounts for the increased revenues.

4.2 Arterials and Local Streets - Impact Areas

The arterial and local street segments most likely to be affected by alternative subway plans are those in the vicinity of proposed new or modified subway stations and grade crossing eliminations. For each subway option, traffic impacts on the local streets in the critical areas are discussed. Complete details of the areas including arterial descriptions, parking, vehicular and pedestrian station access and a description of existing operating conditions are included in the Technical Supplement.

Construction activity will also affect traffic. At most of the critical areas it would be confined to off peak hours to minimize adverse traffic impacts. Where necessary, periodic lane closures and street re-routings would be implemented without significantly adverse impacts. Traffic conditions in areas where construction procedures are not typical of system-wide procedures or where impacts are likely to be significant, are discussed under a separate construction heading.

The most extensive traffic impacts occur under the Queens Bypass alternative because of the proposed major construction activity under Yellowstone and Queens Boulevards. Both the Montauk/Archer and Montauk Transfer alternatives call for elimination of grade crossings which will affect local traffic and

TABLE 4-16

ESTIMATED ANNUAL YEAR 2000 INCREMENTAL REVENUE
VALUES IN 1983 DOLLARS

Revenue ($ 000)

Mode	Base[1]	No Additional Construction	Local Connection	Queens Bypass	Subway/ LIRR Transfer	Montauk/ Archer
Subway	318,865	15,338	15,437	17,207	559	16,034
LIRR	336,951	676	562	-4,929	-12,542	-4,062
Montauk Transfer (2)						
NYCTA	0	0	0	0	4,802	0
LIRR	0	0	0	0	34,461	0
Surface						
NYCTA	51,464	1,816	1,833	2,704	-3,319	1,608
Private	69,103	1,667	1,669	1,778	1,324	281
NYCTA	370,329	17,154	17,270	19,911	2,042	17,642
LIRR	336,951	676	562	-4,929	21,919	-4,062
Private Bus	69,103	1,667	1,669	1,778	1,324	281
Total	$776,383	$ 19,497	$ 19,501	$16,760	$ 25,285	$ 13,861

(1) Forecast transit revenues at 1983 ridership levels using year 2000 fares. LIRR base includes year 2000 ridership since LIRR capital program is enabling the expected growth to occur.
(2) Subway/LIRR transfer ridership is to Thomson station.

circulation patterns. Increased service at the new Fresh Pond Road and Woodhaven Boulevard Stations, proposed by the Montauk/Archer alternative will increase traffic congestion on area streets. However, the elimination of the elevated structure along Jamaica Avenue called for by this alternative will ultimately improve operating conditions along Jamaica Avenue. The Montauk Transfer alternative includes modifications to existing LIRR stations which will increase service and disperse congestion near some of the stations. The Queens Boulevard Local Connection entails some construction impacts from additional trackage under Northern Boulevard. The new stations proposed at Parsons and Sutphin Boulevards along the Archer Avenue subway line under the No Additional Construction alternative will increase congestion in the vicinity of both these stations.

4.2.1. No Additional Construction

4.2.1(a) 21st Street/41st Avenue Subway Station

An insignificant increase in surface transportation is projected to the station for the year 2000 having negligible effect on local streets and arterials. Most trips to the station (over 450 during the peak hour) will be by pedestrians. Pedestrian access is discussed in the Technical Supplement.

4.2.1(b) Parsons Boulevard/Archer Avenue Subway Station

Serving as the eastern terminus of the Archer Avenue Subway line, the Parsons Boulevard station is expected to generate the largest number of trips under this alternative. The MTA projects that approximately 3,400 trips by bus would be attracted to the station during the peak hour. In addition, an estimated 760 automobiles would be added to the street network in the peak hour.

Archer Avenue is scheduled to be constructed 62 feet wide curb-to-curb which allows for a minimum of two moving lanes in each direction with potential for a dedicated bus lane on the south side. The southern access to the station at the intersection with Parsons Boulevard includes an escalator/elevator and serves as the primary entrance. The south curb of Archer Avenue has a set back for bus operations east of 150th Street for a length of approximately 400 feet.

With the E line subway service shifted to Archer Avenue, several bus routes would be rerouted from 169th Street to the station via Jamaica Avenue to Archer Avenue. Rerouting the Q4, 4A, 5, 5A, 5AB, 110, 111, 112, 113 and N4, (MSBA is planning to discontinue the N5 route) would place approximately 90 additional buses during the peak hour on Jamaica Avenue and 136 buses per hour on Archer Avenue at the station.

New York City Department of Transportation traffic counts taken prior to the construction activity in the area show an almost equal directional flow of moderately heavy traffic on Jamaica Avenue during the afternoon peak hour. The flow is more predominant eastbound on Archer Avenue.

Because of the station's geographic location, afternoon peak direction is expected to be predominantly eastbound along Archer and Jamaica Avenues and southeast along New York and Merrick Boulevards. To a lesser degree, afternoon peak hour traffic would be increased northbound on Parsons Boulevard.

The repaving of Archer Avenue with the provision of a minimum of two moving lanes and bus loading facilities along the southern curb should minimize some of the impact of the additional vehicles. Nevertheless, the impact of over 100 buses per hour in addition to 760 automobiles dispersed over two east/west arterials would significantly increase eastbound congestion in the afternoon. There is however, adequate capacity to accommodate the additional volumes.

The number of additional automobiles due to the station would result in an increase in demand for parking spaces on the major and minor streets as well as in off-street facilities.

4.2.1(c) Sutphin Boulevard/Archer Avenue Subway Station

It is projected that the station would generate approximately 4,250 person trips to the site during the peak hour in the year 2000. Of these, only 25 percent would arrive and depart by auto and the remainder by feeder bus service. An estimated 760 additional automobiles are added to the street network during the peak hour with no scheduled increase in bus frequency.

Because of current construction activity at the station, NYCDOT hourly traffic counts taken prior to the construction were used to assess existing traffic volumes in the immediate vicinity of the station. The station entrances at the four corners of the intersection of Sutphin Boulevard and Archer Avenue are convenient and allow for vehicular drop offs and pick ups via both streets. In addition, vehicles seeking on and off street parking distribute along Jamaica Avenue, 150th Street and the local one way streets in the area.

Eastbound, during the afternoon peak hour, existing volumes on Jamaica and Archer Avenue were moderately heavy. Volumes were lower westbound. Due to the location of Parsons Boulevard Station to the east it is expected that the predominant direction of traffic flow generated at the Sutphin Boulevard station would be to the west along Jamaica and Archer Avenues and to a lesser degree north and south along Sutphin Boulevard in the afternoon.

The impacts of these additional vehicles in the afternoon are expected to raise westbound traffic volumes on Jamaica Avenue to approximately the same level as the existing eastbound volumes resulting in peak hour congestion in both directions; westbound Archer Avenue volumes would exceed existing eastbound volumes due to the additional traffic and would result in peak hour congestion in the eastbound direction. However, with a minimum of fifty percent of the signal cycle given to westbound traffic, Archer and Jamaica Avenues could both accommodate the additional vehicles seeking a westbound route (approximately 500 automobiles per hour). North and southbound Sutphin Boulevard is currently heavily traveled and would be increasingly congested due to the additional traffic.

Significant numbers of subway riders boarding and discharging surface transportation vehicles at the Sutphin/Archer Station are expected to effect through traffic on the streets. The suggested relocation of some bus stop locations to the west sidewalk of Sutphin Boulevard, under the LIRR viaduct south of Archer Avenue, would relieve some of the congestion at the intersection. It would also provide passenger shelter and convenient access to the escalator/elevator exit from the station.

Additional automobiles attracted to the station would result in an increase in demand for parking spaces on the major and minor streets as well as off-street facilities.

4.2.1(d) Jamaica Avenue/Van Wyck Subway Station

The new station is expected to generate approximately 1,380 trips during the peak hour in the year 2000. Over 75 percent would be pedestrian trips. The 24 buses currently serving the area in the peak hour can adequately accommodate the projected 250 bus trips to the site. Approximately 60 automobiles are expected on the local street network during the peak hour. These would have a negligible impact on traffic conditions. Pedestrian access is discussed in the Technical Supplement.

4.2.1(e) Jamaica Avenue Elevated Line

Eliminating the two stations at Metropolitan Avenue and Queens Boulevard will marginally improve traffic conditions in the area. Upon completion of the Archer Avenue Subway, Q49 bus service along Jamaica Avenue will be discontinued, and 80 buses per hour removed from the arterial during peak hours. Demolition of the elevated structure along Jamaica Avenue will allow intersection improvements where necessary to improve traffic flow along Jamaica Avenue. Construction impacts of the demolition should not be significantly adverse.

4.2.2 Queens Boulevard Local Connection

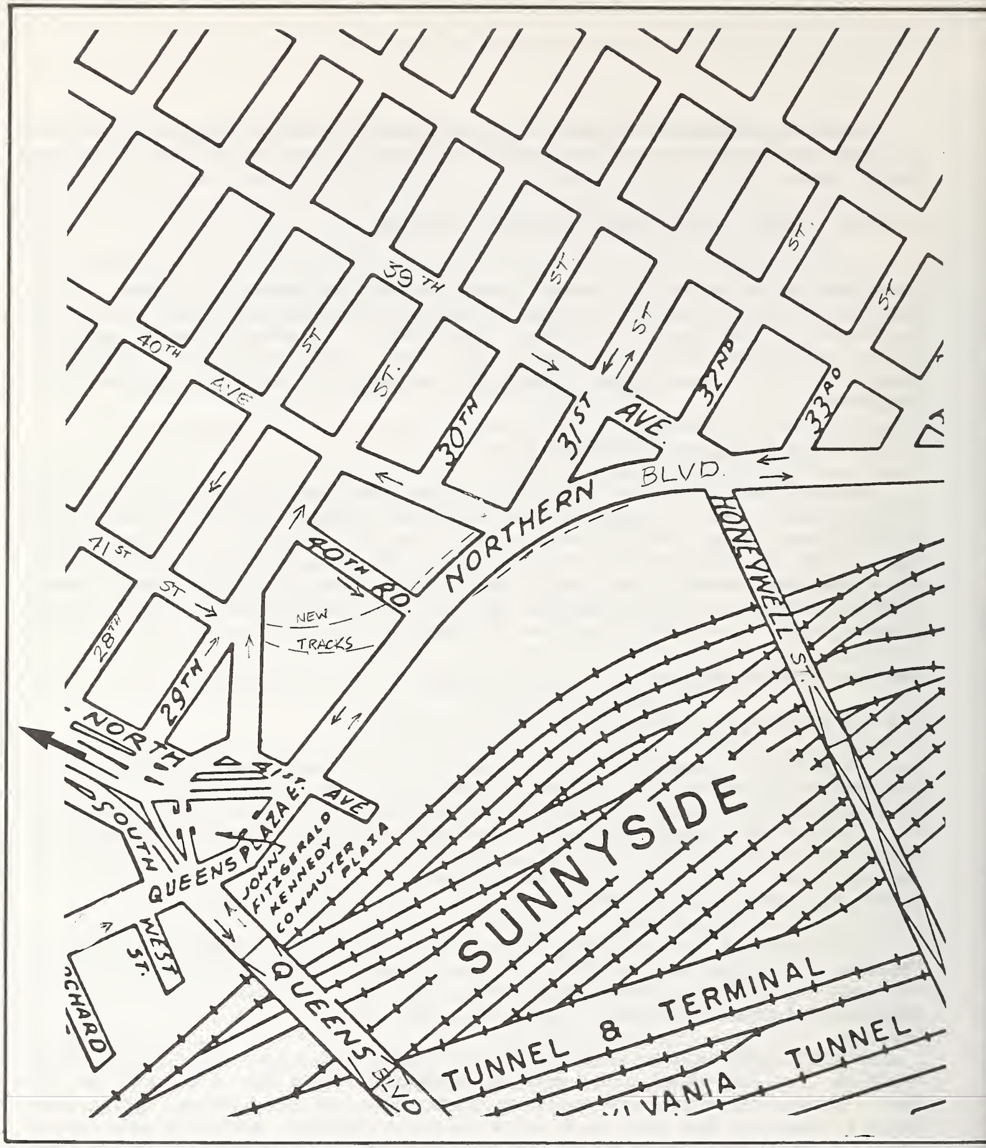
4.2.2(a) Additional Trackage to Northern Boulevard

Construction Impacts. During construction, approximately 900 feet of sidewalk on the south side of Northern Boulevard from 40th Road until just west of Honeywell Street, would be closed to pedestrians and driveway access obstructed. Many of the businesses fronting the southeast of Northern Boulevard would require driveway access to their properties. This would be provided via a temporary deck over which would impair pedestrian access. The area is shown in Figure 4-1 and corresponds to Local Impact Area 5 shown on Figure 3-4.

The eastbound curb lane on Northern Boulevard would be temporarily closed to vehicles while sheeting is driven through the street adjacent to the tracks. This activity would be restricted to off peak hours. Off peak traffic could be accommodated despite periodic loss of one lane.

For the westbound connection, the curbside traffic lane would be closed to vehicles from 40th Road until west of Honeywell Street for a distance of 270 feet. Construction activity would be confined to off peak hours; during peak hours a temporary deck over would allow vehicular passage. Access to 40th Avenue and 40th Road would be blocked, and vehicles would have to seek alternative routes. Construction activity would be staged to ensure that both streets were not closed at the same time. Any resulting impact would be minimal.

Manual counts taken at Northern Boulevard and 40th Avenue during peak hours indicate extremely heavy morning volumes (7:30 - 8:30 AM) westbound on Northern Boulevard. Northern Boulevard is one of the principal routes to the Queens-



Legend
- ← Direction of traffic flow
- ⟵ Route to Queensborough Bridge

NORTHERN BOULEVARD AREA Figure 4-1

0 — 430
Scale in Feet

N

borough Bridge, with peak flow traveling eastbound during the evening commuter rush. Approximately 20 percent of Northern Boulevard originated from or was destined to 31st Street.

Construction activity at 31st Street would constrain access to Northern Boulevard. However, one lane on 31st Street would remain open at all times. Parking on the east side of 31st Street could be prohibited during the construction to replace the traffic lane.

While traffic flow would be hampered during the construction, confining lane closures to off peak hours would accommodate the off-peak traffic volumes.

4.2.2(b) Court Square Pedestrian Connection

Construction Impacts. During construction of the pedestrian connection, the private parking lot between 44th Drive and 45th Avenue would be closed and the temporary loss of spaces would increase parking demand in the vicinity.

4.2.3 Queens Bypass Express

4.2.3(a) Northern Boulevard/41st Avenue Station

Travel demand generated by the new station is expected to be minimal and the impact on the street network will be negligible. No change in bus routings or headways is scheduled. Pedestrian access is discussed in the Technical Supplement.

Construction Impacts. Construction activity would be confined to off-street tunneling and will have a minimal impact on operating conditions on Northern Boulevard.

4.2.3(b) Additional Trackage to Continental Avenue

Construction Impacts. While construction of the Queens Bypass Express will require temporary detours, lane closures and alternative routings at various locations between the proposed Northern Boulevard station and the 71st Street Continental Avenue station, the impacts will be minor and alternative routings will be available. A detailed description of all impact locations along the Bypass is found in the NYC Transit Authority Report, Route 131-B. (See List of References in the Appendix). Route 131-B. More significant impacts will occur due to the extensive construction activity under Yellowstone and Queens Boulevards.

During construction, the eastbound service road of Queens Boulevard between Yellowstone Boulevard and 71st Avenue would be closed to through traffic. Bus service along the service road would be diverted either at Yellowstone Boulevard to Hoffman Boulevard, accessing the subway station at the service road between 70th Road and Continental Avenue; or along the Queens Boulevard line. Vehicular traffic would be diverted to this line and along Austin Street. Continental Avenue would remain open to through traffic. Congestion in the area would be significantly increased and access to the subway station and surrounding shops and businesses impaired.

The service road carries approximately 900 vehicles eastbound during the afternoon peak hour and is congested. A significant portion of service road vehicles would have to divert to alternative routes. The three eastbound lanes of Queens Boulevard approach capacity level at 2,100 vph during the afternoon peak hour; and therefore, the service road vehicles could not all use this artery but would have to seek alternative routings. If this is not acceptable, the Queens Boulevard median between the mainline and service road could be removed to reapportion lane use in the eastbound direction.

On the north side of Queens Boulevard, construction activity between 72nd Avenue and 72nd Road would temporarily close one lane of westbound traffic during off peak hours until decking is in place. The two remaining through lanes would accommodate the additional volumes.

Construction activity under Yellowstone Boulevard between Austin Street and Queens Boulevard would close one traffic lane in each direction. A deckover at the Queens Boulevard intersection would allow buses to detour off the service road to Hoffman Boulevard.

Manual counts taken on Yellowstone Boulevard northbound during the afternoon peak hour show that few vehicles turned right onto the Queens Boulevard line and service road eastbound. The majority of northbound traffic continued northbound on Yellowstone past Queens Boulevard. Closing the eastbound Queens Boulevard service road to Yellowstone Boulevard traffic would have minimal impacts.

Southbound traffic on Yellowstone Boulevard is moderately heavy with 660 vph travelling on the two lanes during the afternoon peak. During construction on Yellowstone, either a deckover would be used during the peak hours or two traffic lanes left open for the two-way traffic. One traffic lane for each direction would significantly increase the congestion on the roadway but the traffic volumes could be accommodated.

4.2.3(c) Woodside Avenue Station

The travel demand generated by the new station is expected to be minimal and the impact on the street network will be negligible. No change in bus routings or headways is scheduled. Pedestrian access is discussed in the Technical Supplement.

Construction Impacts. Construction of the station may require moderate lane restrictions on 61st Street and Roosevelt Avenue. Traffic in the vicinity is moderate and although congestion would be increased, one available lane in each direction would accommodate the traffic flow.

4.2.3(d) 71st - Continental Avenues Station

No significant change in feeder bus service or vehicular drop-offs is expected at the station and therefore the impact on local streets and area parking is minimal.

Construction Impacts. During construction activity, the eastbound service road would be temporarily closed to through traffic with provisions to allow buses access to the station. Pedestrian access would also be hampered by the construction. (See discussion under "Additional Trackage to Continental Avenue".)

4.2.4 Subway/LIRR Montauk Transfer

The number of people traveling to the five southeast Queens railroad stations under this alternative will depend upon the pricing scheme of the railroad ticket and combination railroad/bus ticket ultimately chosen--the lower the fare, the more attractive this mode of travel. For purposes of this analysis, a mid-level pricing scheme was used for each station. Generated traffic volumes would increase somewhat with a lower fare and decrease somewhat with a higher fare structure.

4.2.4(a) Thomson Avenue Transfer Station

Since the station is designed as a transfer station between the Long Island Rail Road and the subway line extending from the 63rd Street Tunnel, a negligible surface transportation impact is expected. Access to the station is proposed via the Queens Plaza station. No change is expected in feeder bus service to the Queens Plaza station and only a minimal increase is projected in vehicular drop-offs at the station.

Construction Impacts. Construction activity would be mainly confined off-street in the Sunnyside Yards and would have a minimal effect on the street network. Tunnel work under Northern Boulevard would commence in a private parking lot north of Northern Boulevard and proceed far enough underground not to impact surface conditions. Access to industries south of Jackson Avenue would be maintained via Queens, Orchard and West Streets.

4.2.4(b) LIRR/Richmond Hill Station

Under this alternative, improvements to the Richmond Hill station are the same as described for the Montauk/Archer alternative. A new entrance to the station, equipped with an elevator for access for the handicapped, will be provided on Hillside Avenue.

No change in bus routings or headways is planned but it is proposed to coordinate bus service to the train schedule to provide adequate feeder service.

Approximately 110 additional vehicles are expected on the local area streets during the peak hour. Distributed along Lefferts Boulevard, Hillside and Myrtle Avenues, their traffic impact would be small. Parking demand in the vicinity would also increase nominally.

4.2.4(c) LIRR/Locust Manor Station

Using the mid-level pricing scheme, an estimated 1,580 person trips are expected at Locust Manor during the peak hour in the year 2000. The majority of these trips (1,150) will be made by pedestrians. Approximately 430 additional trips will be by bus with a very small percentage of auto drop-offs at the station.

One new bus route is proposed along Springfield Boulevard heading north from the station. Designated as the Q77LM, it would head east along 119th Avenue. The route will provide a minimum service of five buses per peak hour. This route, in addition to the existing bus routes, would be coordinated to the train schedule and would provide adequate feeder service to the station.

The proposed station renovations provide for an off-street bus loading facility west of Farmers Boulevard between the station and Garrett Street (mapped street).

Traffic impacts in the area are expected to be minimal because of the small increase in vehicular volumes.

4.2.4(d) LIRR/Laurelton Station

The mid-level price scheme is expected to attract approximately 1,220 person trips to the station during the peak hour in the year 2000. Over 65 percent of these trips (780) will be by pedestrians. Of the remainder, 360 trips are projected by bus and 130 by automobile. No provisions are being made for additional bus routings to the station but frequency of the Q5A shuttle bus would increase by one bus per hour.

New entranceways, accessible to the handicapped, would be provided in the middle of the station between 224th and 225th Streets in addition to an upgrading of the existing access points at each end of the station.

It is proposed to use the existing parking lot as a bus turnaround facility to minimize traffic impacts along 225th Street. The loss of parking spaces will increase off-street parking usage along the residential streets surrounding the station where the supply is more than adequate to accommodate additional vehicles.

The few additional buses loading/unloading off-street and approximately 90 additional autos added to the street network during the peak hour would marginally increase congestion along 225th Street and have a minimal impact on traffic conditions on North Conduit Avenue.

4.2.4(e) LIRR/Rosedale Station

Using the mid-level pricing scheme, an estimated 820 person trips are expected to the Rosedale Station during the peak hours in the year 2000. Only 160 trips are expected by bus and approximately 280 by pedestrians. Auto trips to the station are projected to add approximately 250 vehicles to the street network during the peak hour.

No new bus routings are proposed to service the station as feeder service is adequate. However, the Q5 shuttle would increase peak hour frequency by two buses per hour and would extend its northern terminal to 130th Avenue via Brookville Boulevard.

Proposed station renovations call for a modification of the western end of the station to provide access for the handicapped. In addition, a portion of the municipal parking lot east of Francis Lewis Boulevard would be used as a bus circulation route leading from Francis Lewis Boulevard to North Conduit Avenue. Bus loadings/unloadings would be removed off-street to the parking lot reducing traffic congestion in front of the station entrances on Francis Lewis Boulevard.

The bus turnaround eliminates some off-street parking spaces from the lot, as well as on-street parking along the south side of North Conduit Avenue. Parking along the residential streets surrounding the station would be increased but the supply is adequate to accommodate all vehicles.

The majority of the 250 autos travelling to the station would be originating south of Sunrise Highway using both Francis Lewis and Brookville Boulevards as access routes. With bus loadings/unloadings eliminated from Francis Lewis Boulevard, the two streets could accommodate the additional volume although traffic congestion would be increased.

4.2.4(f) <u>LIRR/Hollis Station</u>

Approximately 1,590 person trips would be generated by the renovated station at Hollis during the peak hours using the mid level pricing scheme. Of these, 510 trips per peak hour are expected by pedestrians and 810 by bus. The remaining trips would add an estimated 180 automobiles to the street network during the peak hours.

One new bus route, designated as the Q75H, is proposed to service the station from areas north along Union Turnpike accessing the station on Farmers Boulevard. A minimum of five buses per peak hour is proposed. In addition, frequency of the Q3 route would be increased by two buses per peak hour along Farmers Boulevard.

The station renovations provide for a bus loading/unloading area on 99th Avenue. It is proposed to divert some Jamaica Avenue buses along 99th Avenue for better passenger accessibility to the station.

Pedestrian access for the handicapped will be provided at an entry point along 99th Avenue while existing entrances to the station would be maintained.

Although local area streets have the capacity to accommodate an additional 180 vehicles during the peak hour, traffic congestion at the junction of Farmers Boulevard and Hollis Avenue would become quite severe. A traffic signal at the intersection may be warranted.

4.2.4(g) <u>LIRR/Queens Village</u>

The mid-level price scheme is expected to attract approximately 1,075 person trips to the Queens Village station during peak hours. An estimated 400 trips will be by pedestrians and 540 by feeder bus. The remaining trips are projected to place approximately 120 vehicles on the street network during the peak hours.

It is proposed to supplement the existing bus service to the station by one new route, designated the Q27QV. The route would follow the existing Q27 route north on Springfield Boulevard until Union Turnpike where it would turn east to the city line. The expected frequency of the route is five buses per peak hour.

The station renovations would improve the existing entrance on Springfield Boulevard to allow access for the handicapped. The entrance on 218th Street would be eliminated, increasing pedestrian activity and vehicular drop-offs along Springfield Boulevard. No changes are proposed for the municipal parking lot.

Local area streets would be able to accommodate the additional 120 vehicles during the peak hours. However, congestion along Springfield Boulevard, particularly by the intersection with Jamaica Avenue where buses re-enter Springfield Boulevard from the bus loading area, would significantly increase.

4.2.4(h) At-Grade Crossing Modifications

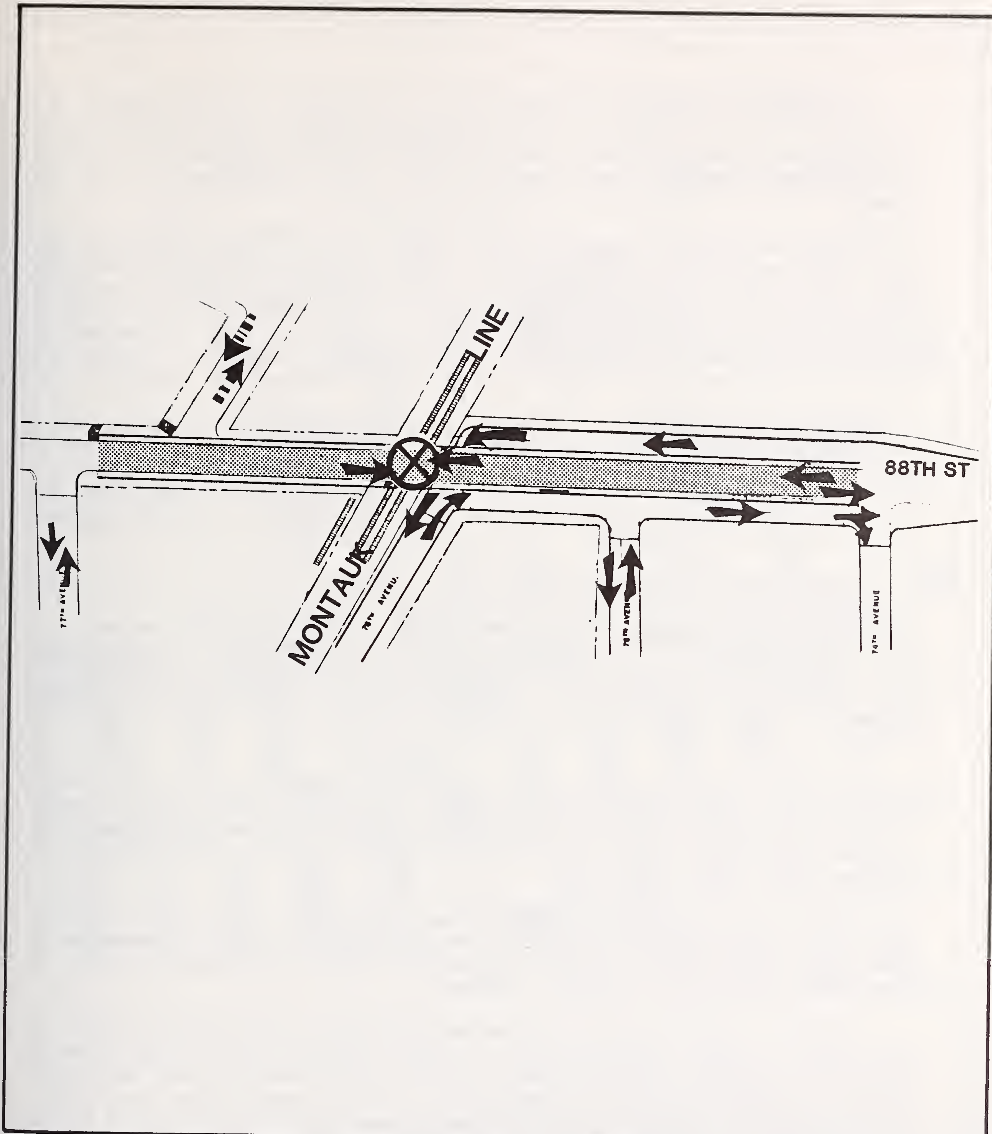
Under the Montauk Transfer and the Montauk/Archer alternatives, locations where streets cross the existing LIRR Montauk Line at-grade would require modifications. Figure 2-13 locates the crossings in Maspeth and Glendale, while Figure 3-4 shows the crossings in Queens as a whole.

88th Street Location. The northern terminus of the bridge on 88th Street is proposed just south of 74th Avenue reaching grade north of 77th Avenue south of the tracks. Figure 4-2 depicts directional flows of traffic in the vicinity with the grade crossing elimination.

The major traffic impact of this alternative is the accessibility to properties north of the tracks and south of 74th Avenue. In addition to access for the local residents, industries and retail units fronting 88th Street require adequate truck access. A one-way service road would be provided on 88th Street at grade west of the bridge for southbound traffic, passing under the bridge at 76th Avenue and continuing northbound on the eastside of the bridge. There would be an increase in travel time and distance for southbound vehicles seeking access to the east side of 88th Street south of 74 Avenue.

All vehicles originating south of 74th Avenue wishing to cross the tracks southbound would travel via the proposed service road to 74th Avenue and turn onto 88th Street for bridge access via Rutledge Avenue. Both Rutledge and 74th Avenue are residential streets which would handle a large number of trucks under this alternative. In addition, the service road would be 20 feet wide, sixteen feet narrower than the existing curb-to-curb width on 88th Street. It has been observed that large trucks currently utilize the full curb-to-curb width to maneuver into driveways. Truck access would be hampered by the restricted width.

Northbound traffic seeking access to properties on both the east and west sides of 88th Street south of 74th Avenue would also be inconvenienced in distance and time. Traffic would exit from the bridge and turn around via 74th and Rutledge Avenues for service road access.



Legend

- At-grade crossing to be eliminated
- Existing traffic flow
- Traffic flow with grade crossing eliminated
- Proposed elevated structure over existing at-grade crossing

0 125
Scale in Feet

88TH STREET GRADE CROSSING ELIMINATION

Figure 4-2

South of the tracks, the bridge aligns slightly to the east, keeping the 77th Avenue access to 88th Street on the west side open. There is no proposed provision for a service road. The commercial property located north of 77th Avenue on the eastside of 88th Street would have to use 77th Avenue for driveway access.

Access for through traffic across the tracks will be maintained during construction of the north and southbound outer service roads which is planned for the initial phase of construction. It is proposed that the bridge be built in two phases so that one lane can be maintained for through traffic during most of the construction periods. Provisions will be made for deck over access to properties fronting 88th Street during construction. In addition, vehicles can easily use both Woodhaven Boulevard and 80th Street as temporary detours.

73rd Street Location. Eliminating the grade crossing at 73rd Street would have a minimal impact on traffic conditions in the area as a very small number of vehicles use the crossing for access to the north side of the tracks. However, the elimination entails a lengthy detour via Cooper Avenue and 80th Street and will cause an inconvenience to the few residents, florist patrons and those seeking access to the cemetery. The detour is outlined in Figure 4-3.

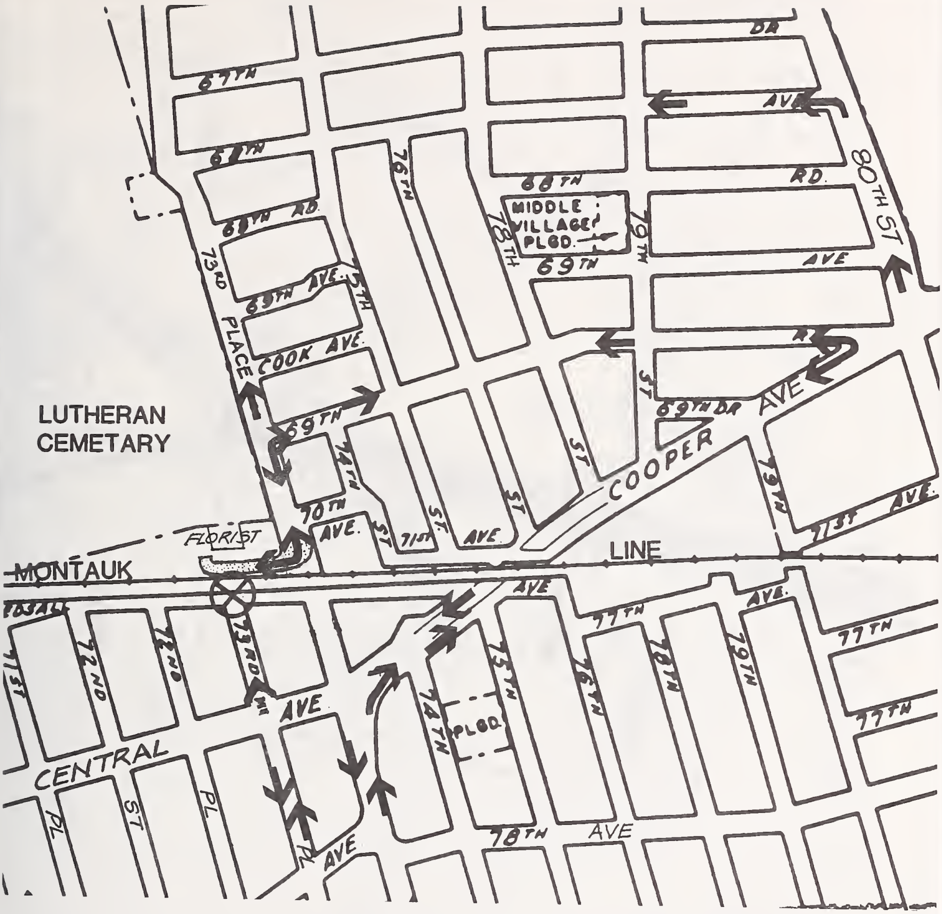
Maspeth Avenue/49th Street Location. The grade separated crossing over the railroad tracks would begin on the north end at the five-legged intersection of Maspeth Avenue, Maurice Avenue, 56th Terrace, 57th Place and 58th Street. It would have minimal effect on the circulation of traffic south of the tracks within the industrial area where the existing street network would be maintained (See Figure 4-4). The crossing at 49th Street would be eliminated and the small volume of traffic presently using it would divert to Maspeth Avenue (See Figure 4-5).

North of the tracks, the proposed ramp, while following the same alignment as now exists, would allow northbound traffic to travel at higher speed because of the downgrade and improved paving. Traffic conditions at the five-legged intersection may worsen due to the accelerated speeds down Maspeth Avenue. A traffic signal may be warranted.

There are currently vehicles destined for Grand Avenue utilizing the Maspeth Avenue crossing. An increase in traffic of this nature is expected in addition to the diverted traffic from 49th Street, but the impact should be insignificant because of the small volumes.

Access to properties off existing Maspeth Avenue north of the tracks, in particular the diner located east of Maspeth Avenue, will be significantly impaired. Vehicles currently entering the diner from Maspeth Avenue would have to use a circuitous diversion to Rust Street or 57th Street (one-way westbound). The realignment of 57th Place should somewhat improve traffic flow at the intersection, easing turning movements from the road onto Maspeth Avenue northbound and Maurice Avenue.

During construction of the ramp, a section of Maspeth Avenue would be closed from just south of the five-legged intersection to south of the railroad tracks.



Legend
- ⊗ At-grade crossing to be eliminated
- New access road
- Existing traffic flow
- Traffic flow with grade crossing eliminated

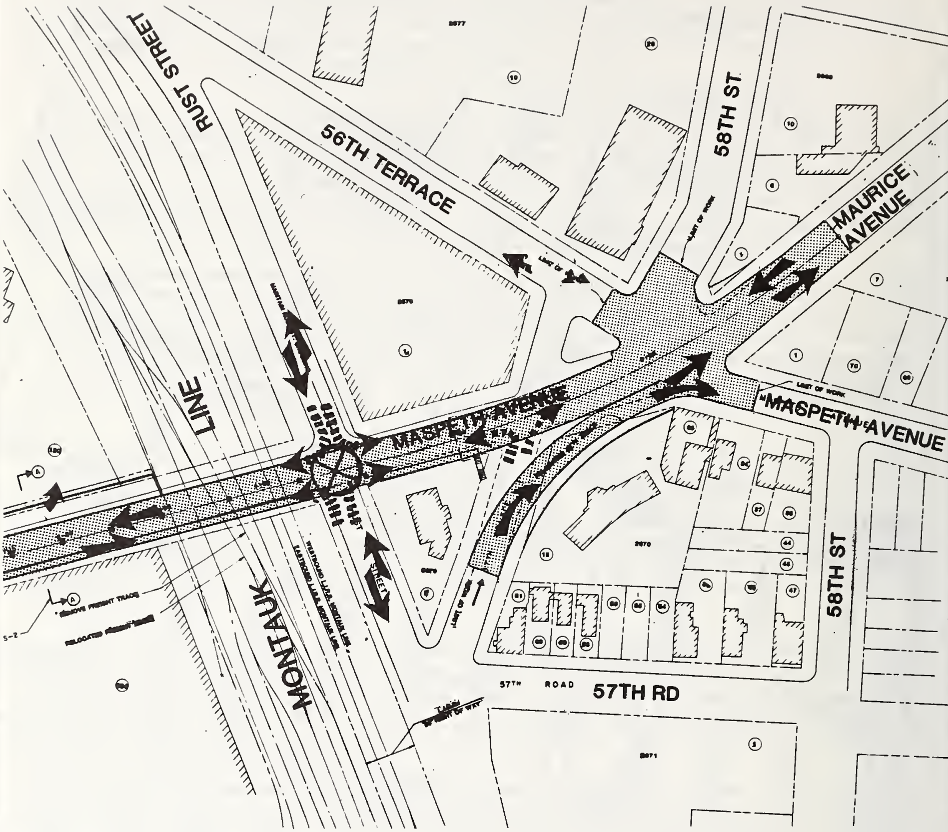
0 500

Scale in Feet

N

73RD STREET GRADE CROSSING ELIMINATION

Figure 4-3



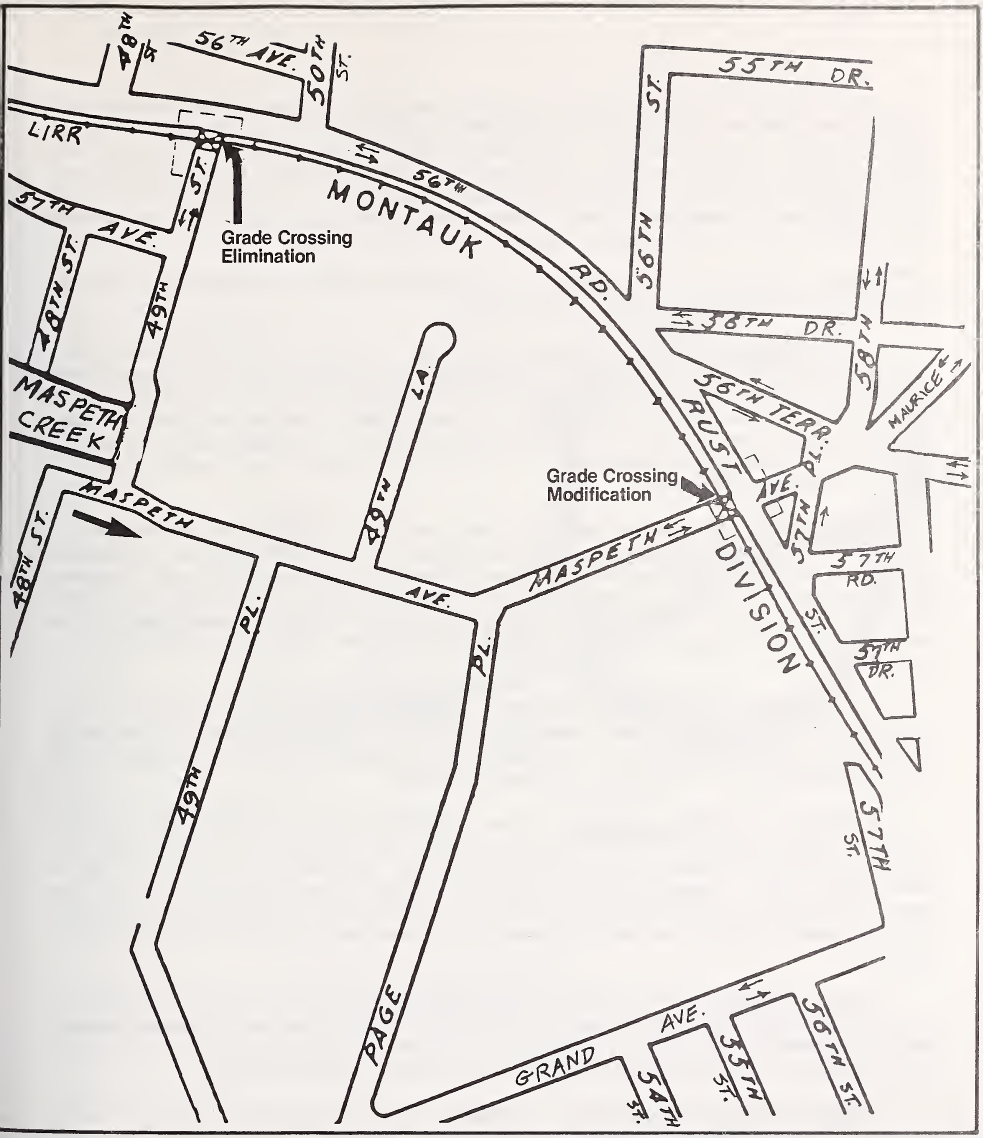
Legend
- ⊗ At-grade crossing to be eliminated
- New alignment
- Existing traffic flow
- Traffic flow with grade crossing eliminated

0 125
Scale in Feet

N

MASPETH AVE. GRADE CROSSING ELIMINATION

Figure 4-4



Legend

Through traffic on 49th Street diverted to Maspeth Avenue with 49th Street grade crossing elimination

0 430
Scale in Feet
N

MASPETH AVENUE/49TH STREET LOCATION Figure 4-5

The crossing at 49th Street will remain open until construction is complete. Traffic destined to the industrial area south of the tracks can divert to either 49th Street or Grand Avenue. Circulation from Grand Avenue can be via Page Place, a street with two operating lanes in each direction; 49th Place, a one-directional northbound road with two operating lanes or 47th Street with one operating lane in each direction. These three roads all connect to the segment of Maspeth Avenue unaffected by the construction activity.

While traffic can be handled by alternative routes, travel time will be increased for occupants south of the tracks.

43rd Street/Laurel Hill Boulevard Location. Both crossings at Laurel Hill Boulevard and 43rd Street would be eliminated and replaced with a diagonal ramp extending from a realigned 56th Road through property owned by New York City under the Brooklyn-Queens Expressway and crossing the tracks at the former Phelps Dodge property (See Figure 4-6). South of the tracks, a proposed western extension of 57th Avenue would connect to the ramp and allow access westerly to the concrete batching plant.

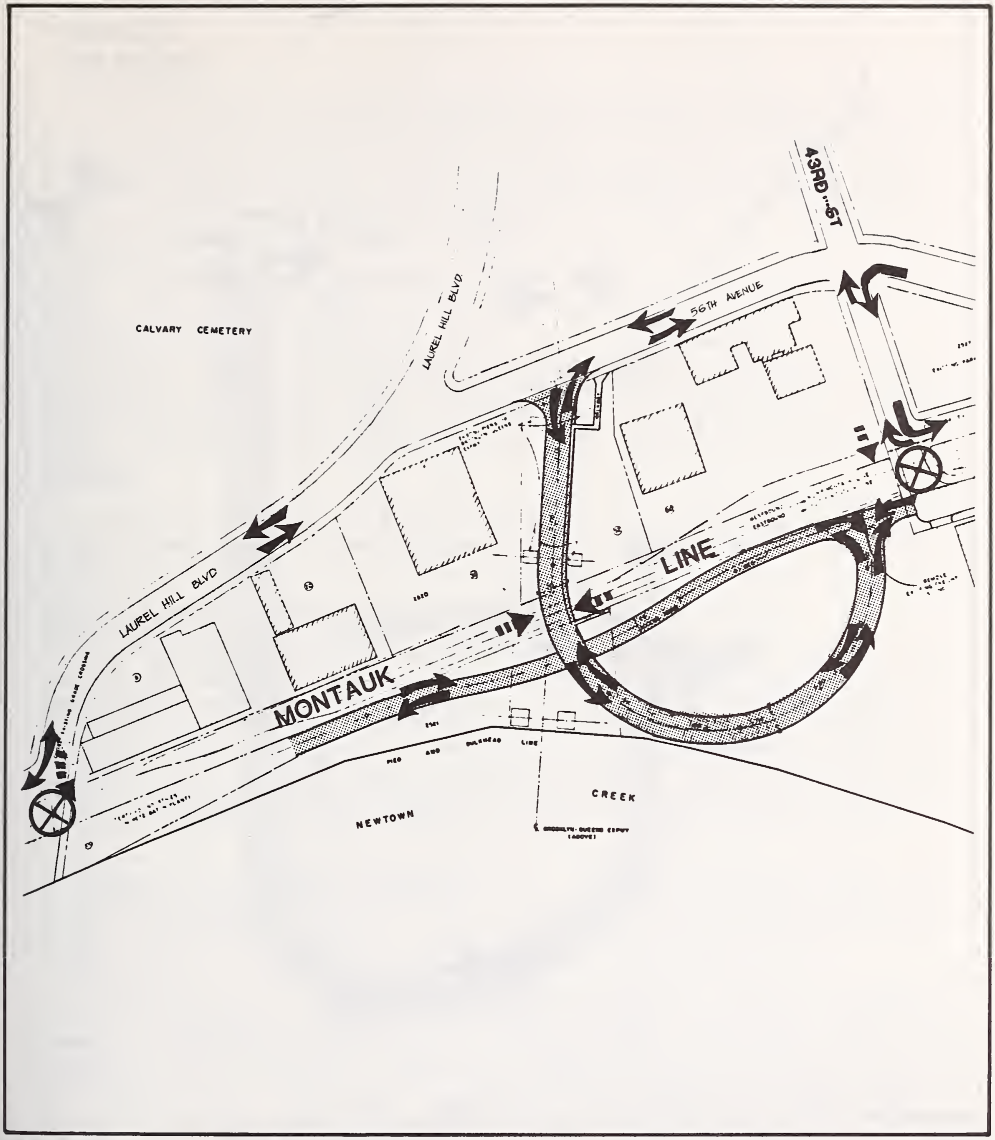
As existing traffic volumes on 56th Road and Laurel Hill Boulevard are small, the only traffic impact under this scheme is access to the two companies. The concrete batch plant would lose direct access across the tracks and increase the travel time of their vehicles. The increase in travel time would be minimal for vehicles at the former Phelps Dodge property via the proposed ramp. The facility would be shared, however, and traffic at the crossing would double in volume.

Construction activity is expected to have minimal impact on traffic as both existing crossings would remain open until construction is complete. There would be minimal diversions for short periods off 56th Road during the reconstruction of 56th Road at the entrance to the new overpass.

Greenpoint Avenue Location. The grade crossing elimination reduces traffic impacts north of the railroad tracks by providing an easier turning movement onto the access road from Review Avenue, particularly for large trucks (See Figure 4-7). Access to the properties south of the tracks both east and west of Greenpoint Avenue would be circuitous and entail increased travel time. The increased volumes on Review Avenue are expected to have minimal traffic impact.

Traffic impacts due to construction would be minimal as the existing service road would remain open until completion of work. Lane closures on Review Avenue may be necessary for short periods of time but as there are presently three moving lanes of traffic on the roadway, the impact would be small.

Jamaica Avenue Elevated Line. Under the Montauk/Archer alternative, the elevated structure along Jamaica Avenue would be removed from Lefferts Boulevard until east of Crescent Street. The seven stations to be eliminated on the Jamaica Elevated are 121st, 111th and 102nd Streets, Woodhaven Boulevard, Forest Parkway, Elderts Lane and Cypress. Traffic volumes along Jamaica Avenue will decrease because of station eliminations and operating conditions will improve.



Legend

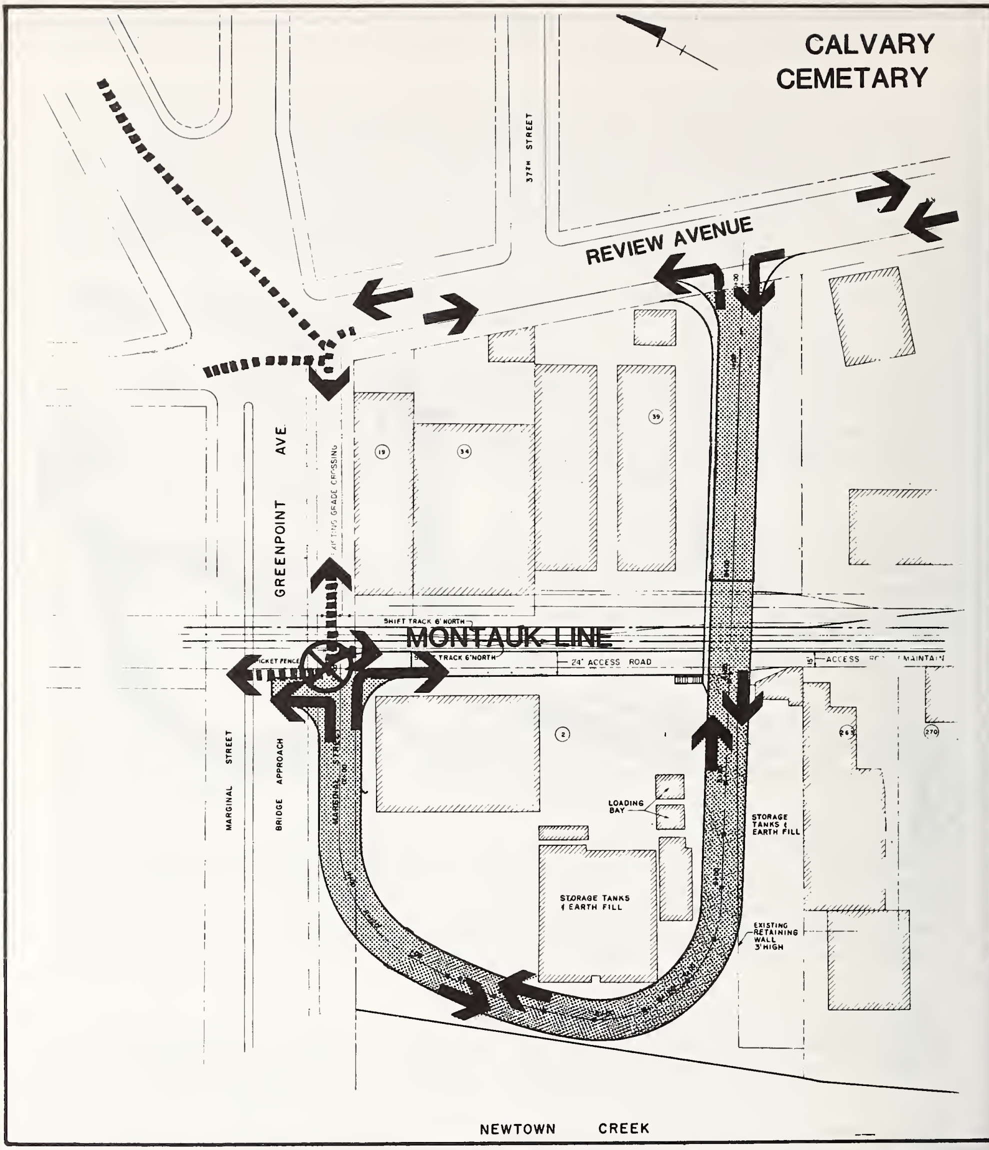
- ⊗ At-grade crossing to be eliminated
- New alignment
- Existing traffic flow
- Traffic flow with grade crossing eliminated

0 125
Scale in Feet

N

LAUREL HILL BLVD. GRADE CROSSING ELIMINATION

Figure 4-6



Legend

- ⊗ At-grade crossing to be eliminated
- New alignment
- Existing traffic flow
- Traffic flow with grade crossing eliminated

0 125
Scale in Feet

GREENPOINT AVE. GRADE CROSSING ELIMINATION

Figure 4-7

When J line subway service is terminated at Crescent Street, a new bus routing, designated the Q49, would provide a free transfer from the subway at Crescent Street along Jamaica Avenue to 121st Street. Proposed frequency is 12 buses per hour and the impact will be nominal. With the removal of support structure from the sidewalks, intersection improvements along Jamaica Avenue, such as turning lanes and approach widenings, can be investigated. Construction impacts of the demolition should be minimal.

4.2.5 Montauk/Archer Avenue Subway Connection

4.2.5(a) Thomson Avenue Station

Traffic impacts under this alternative are expected to be similar to those described for the Thomson Avenue station under the Subway/LIRR Montauk Transfer. In this alternative, the Thomson Avenue Station would function solely as a subway station without transfer facilities to the LIRR. Pedestrian access to the station remains the same with an underpass connection to the Queens Plaza Station.

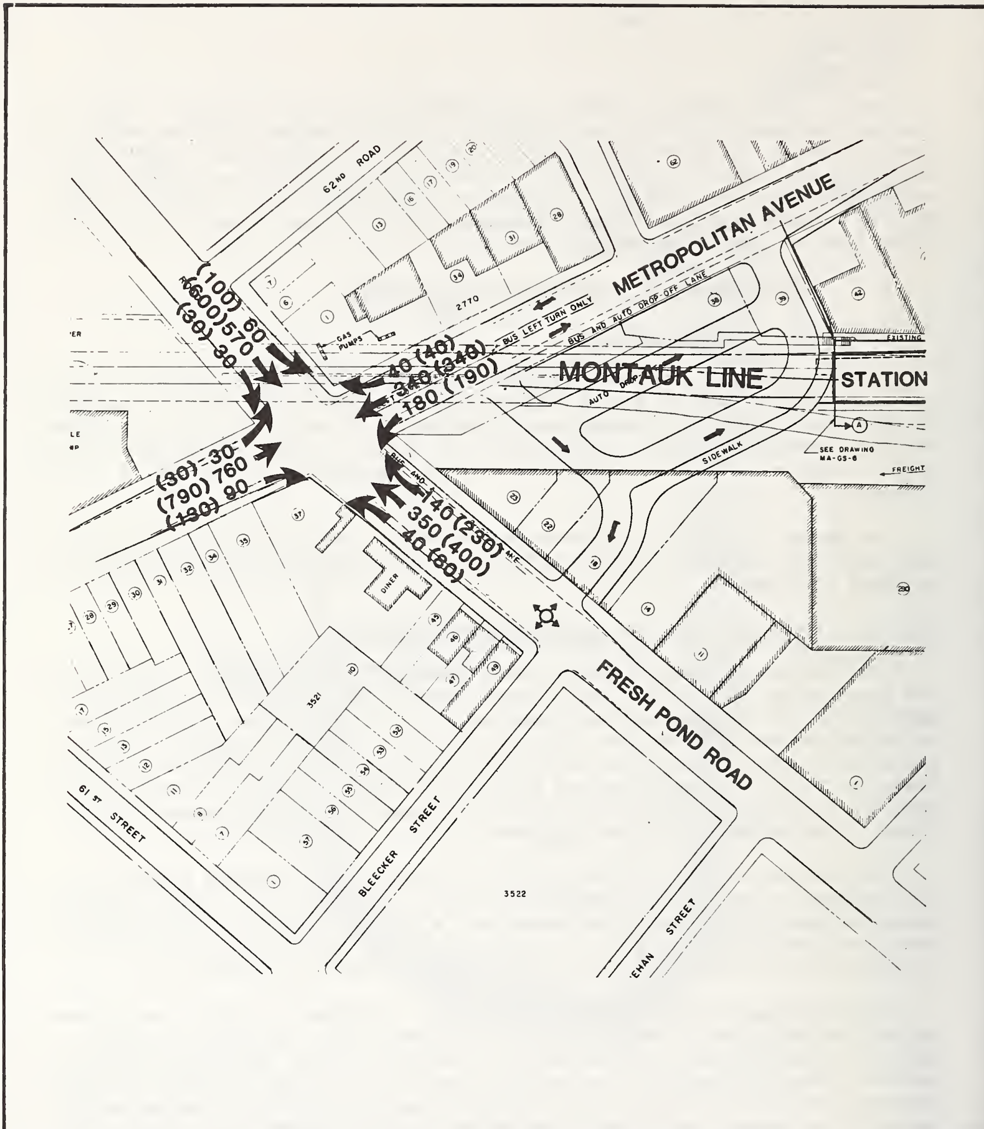
No change is expected in feeder bus service to the Queens Plaza station and only a minimal increase in vehicular traffic is expected along Jackson Avenue and Northern Boulevard.

4.2.5(b) Fresh Pond Road/Metropolitan Avenue Station

The MTA has projected a total travel demand of 3,975 trips per peak hour by the new station in the year 2000. Fifty percent of the trips are expected by pedestrians. Over 1,500 trips per peak hour will be made by bus and are scheduled to be accommodated by the existing bus routes in the vicinity. The only projected change in bus route is an extension of the Q39 along Metropolitan Avenue to Fresh Pond Road. The B58 route will replace a segment from Fresh Pond Road to the Wyckoff subway station with a segment to Myrtle Avenue and 80th Street. Approximately 50 buses per peak hour are anticipated at the station.

To minimize the traffic impact of loading and discharging bus passengers at the station, an off-street bus loading bay is planned at the station with bus access to and from Metropolitan Avenue and a one-way exit from the station to Fresh Pond Road. The east side of Fresh Pond Road by the station would be widened to provide a bus loading bay for the B58 and a vehicular drop off area.

An estimated 330 vehicles are expected to be added to the street network during the peak hours. Because of the relatively large increase in traffic, a capacity analysis was carried out at this location to determine levels of service. The intersection of Metropolitan Avenue and Fresh Pond Road currently operates at level of service C during the afternoon peak hour. Assuming that Metropolitan Avenue would carry the majority of afternoon peak hour traffic eastbound, the intersection will operate at level of service D under this alternative, which reflects acceptable operating conditions. Figure 4-8 depicts traffic volumes at the intersection between 5 and 6 PM in the year 2000 for both the Montauk/Archer alternative and under No Additional Construction conditions.



Legend
40 (80) No additional construction alternative (Montauk/Archer Alternative)

Note: The design of station roadways would be refined if this alternative is selected.

0 125
Scale in Feet
N

FRESH POND RD./ METROPOLITAN AVE.

Figure 4-8

TRAFFIC VOLUMES
5-6 PM Peak Hour Year 2000

There will be an increase in demand for off-street parking which presently is at a premium.

4.2.5(c) Woodhaven Boulevard Station

The station is expected to generate 2,400 person trips in the vicinity during the peak hour in the year 2000. Of these, approximately 1,160 trips will be made by bus which can be accommodated by the existing scheduled frequencies. Trips by automobile will place an estimated 260 additional cars on the surrounding streets during the peak hour.

The MTA has proposed extending the Q23 bus route to service the station via the Woodhaven Boulevard service road which would place 18 buses per peak hour on the access road. In addition, it has been proposed to increase Q11 peak hour frequency by four buses. The total number of buses per peak hour on Woodhaven Boulevard is expected to be 14.

Under this alternative the Woodhaven Boulevard viaduct would be widened to provide both north and southbound pick-up/drop-off areas for bus passengers. Woodhaven Boulevard currently carries approximately 2,750 vehicles southbound over the three-lane mainline during the evening peak hour. At this density, there would be too few gaps in the traffic to allow buses to reenter the mainline without significantly impacting the upstream traffic. It has been suggested to provide traffic signals for re-entering buses at the loading bays which are timed to coordinate with the upstream signals at Metropolitan Avenue for southbound traffic and at Union Turnpike for the northbound, to reduce these impacts.

Automobiles would be prohibited from picking up/dropping off passengers at the bus loading bays on the viaduct. The 260 cars using the station would access the station via the service roads of Woodhaven Boulevard. Presently, the two 25-foot service roads allow curbside parking and provide one moving traffic lane. Due to the impact of vehicular drop offs and frequency of the Q23 bus line it would be necessary to prohibit parking and provide two moving lanes for each road.

4.2.5(d) Richmond Hill Station

The Montauk/Archer alternative provides for a moderate upgrading of the existing station with new pedestrian access (including elevator) at the Hillside Avenue entrance in addition to access on Lefferts Boulevard.

Two thousand of the projected 2,900 total trips to the station during the peak hour will be by pedestrians. An estimated 680 trips per peak hour are expected by bus. No new bus routings are scheduled for the station.

Trips by auto to the station are projected to add approximately 150 vehicles during the peak hour to the street network along Lefferts Boulevard, Hillside and Jamaica Avenues and would have a minimal impact on area congestion. There would also be a small increase in demand for parking both on-street and in off-street facilities.

4.2.5(e) Jamaica Avenue/Van Wyck Subway Station

The station is expected to generate approximately 860 total trips to the vicinity during the peak hour which is 60 percent of the travel demand forecast under the No Additional Construction alternative. The traffic impact on the local streets surrounding the station will be negligible.

4.2.5(f) Parsons Boulevard/Archer Avenue Subway Station

Under the Montauk/Archer alternative, traffic volumes on the streets surrounding the Parsons Boulevard Station would be approximately 12 percent greater than those described under the No Additional Construction alternative. Approximately 850 automobiles would be added to the streets and 3,820 additional bus passengers would access the station during the peak hour. Bus passengers would be accommodated by the additional buses provided by route changes initiated under the No Additional Construction alternative.

A twelve percent increase in vehicular traffic would significantly increase congestion eastbound on Archer and Jamaica Avenues during the afternoon peak hour. However, providing a minimum of sixty percent of the signal cycle is given to the eastbound traffic, conditions would remain at acceptable levels.

4.2.5(g) Sutphin Boulevard/Archer Avenue Subway Station

The traffic impact on the local streets in the vicinity of the Sutphin/Archer Station would be virtually identical to those under the No Additional Construction alternative for this station. Approximately 710 automobiles would be added to the street network and 3,190 persons would be accessing the station by bus during the peak hour.

4.2.5(h) At-Grade Crossing Modifications

Impacts associated with proposed grade crossing modifications are described in the previous section -- Subway/LIRR Montauk Transfer.

4.3 Freight Operations

Two alternatives, Montauk Transfer and Montauk/Archer, utilize the nine mile LIRR Montauk Branch between Jamaica and Long Island City. The branch is currently used primarily to move freight to and from eastern Long Island and to deliver carloads to Queens rail freight receivers. This section describes the integration of frequent passenger service with the existing LIRR freight activity. The physical and operational changes necessary to maintain through freight movement, local delivery and car classification activities are outlined. A more complete description, as well as evaluation of alternative freight operating plans, is contained in Working Paper No. 18: Montauk Branch Rail Freight Operations.

The development of a freight plan for each of the two Montauk operations resulted in the conclusion that only in the case of the Montauk/Archer Avenue Subway Connection would there be any significant institutional changes necessary for continued freight operations. Institutional items as defined in the study relate to federal regulations and labor practices. It is only in the Montauk/ Archer option that these issues are of concern, since the other alternatives maintain the existing types of operation. In the Montauk/Archer Avenue subway connection, the Transit Authority would operate standard subway cars over Long Island Rail Road trackage, while the trackage would continue to be maintained and freight service operated by LIRR personnel. Thus, in determining the operation of this option, the question of institutional concerns must be taken into consideration.

As to relevant federal regulations, two specific agencies were identified -- Federal Railway Administration (FRA) and the Interstate Commerce Commission (ICC). The FRA regulations deal with the equipment requirements of operating freight and passenger service over the same track. ICC regulations involve the status of transit properties which operate or assist in the operation of freight.

4.3.1 Montauk Transfer Alternative

4.3.1(a) Description of Proposed Service Plan

The Montauk Transfer operating plan includes five peak hour Queens-oriented LIRR trains originating at both Queens Village and Rosedale. This plan brings ten electric trains per hour to the Montauk Branch between Jamaica and Yard A in Long Island City, in addition to return trips in the opposite direction. Passengers transfer at the Thomson Avenue Station in Long Island City to TA trains operating via the 63rd Street subway line to Manhattan.

Six Queens-oriented trains operate hourly in each direction during the midday period (three from Rosedale and three from Queens Village), so that some of the peak period trains lay up at Yard A. After the evening peak period, four Queens-oriented trains operate each hour on the Montauk Branch. No Queens-oriented LIRR service is provided between 11:00 PM and 5:30 AM.

Between Jamaica and the Thomson Transfer Station, Queens-oriented trains make one intermediate stop at Richmond Hill. The passenger trains run non-stop between Richmond Hill and the Thomson Transfer Station in Long Island City.

With the advent of Montauk Branch electrification and frequent Queens-oriented service, the present Long Island City diesel passenger service on the branch is discontinued west of Jamaica. With the removal of the three diesel train runs from the Montauk Branch, Penny Bridge, Haberman, Fresh Pond, and Glendale Stations no longer receive rail passenger service. The current diesel passenger equipment trains are also removed from the Montauk Branch and rerouted via the Main Line.

Table 4-17 displays the recommended 24-hour Montauk Branch freight and passenger train schedule for the Montauk Transfer alternative. All freight train operating times are identical to those at present, except that the Fresh Pond Local operates two hours later in the Montauk Transfer alternative. All Montauk Branch rail freight customers continue to receive carload deliveries at their preferred times.

TABLE 4-17
MONTAUK TRANSFER ALTERNATIVE
MONTAUK BRANCH PASSENGER AND FREIGHT TRAIN ACTIVITY

Hour	Eastbound Movements Passenger	Eastbound Movements Freight	Westbound Movements Passenger	Westbound Movements Freight
Midnight-1	None		None	Long Island City Local to Yard A
1-2	None		None	
2-3	None		None	
3-4	None		None	
4-5	None		None	Westbound Hauler from Ronkonkoma and Hicksville to Fresh Pond Jct. and Yard A
5-6	2 trains to Q.V. 2 trains to Rosedale		2 trains from Q.V. 2 trains from Rosedale	
6-7	3 trains to Q.V. 5 trains to Rosedale		3 trains from Q.V. 3 trains from Rosedale	
7-8	4 trains to Q.V. 4 trains to Rosedale		5 trains from Q.V. 5 trains from Rosedale	
8-9	4 trains to Q.V. 3 trains to Rosedale		5 trains from Q.V. 5 trains from Rosedale	
9-10	3 trains to Q.V. 3 trains to Rosedale	Fresh Pond Local from Yard A Bay Shore or Garden City Local	3 trains from Q.V. 3 trains from Rosedale	
10-11	3 trains to Q.V. 3 trains to Rosedale	Fresh Pond Hauler Engines from Yard A to Fresh Pond Jct.	3 trains from Q.V. 3 trains from Rosedale	Fresh Pond Hauler from Fresh Pond Jct. to Yard A
11-Noon	3 trains to Q.V. 3 trains to Rosedale		3 trains from Q.V. 3 trains from Rosedale	
Noon-1	3 trains to Q.V. 3 trains to Rosedale		3 trains from Q.V. 3 trains from Rosedale	
1-2	3 trains to Q.V. 3 trains to Rosedale		3 trains from Q.V. 3 trains from Rosedale	
2-3	3 trains to Q.V. 3 trains to Rosedale		3 trains from Q.V. 3 trains from Rosedale	
3-4	3 trains to Q.V. 3 trains to Rosedale		3 trains from Q.V. 3 trains from Rosedale	Fresh Pond Local to Yard A Bay Shore or Garden City Local to Yard A

TABLE 4-17 (Continued)
MONTAUK TRANSFER ALTERNATIVE
MONTAUK BRANCH PASSENGER AND FREIGHT TRAIN ACTIVITY

	Eastbound Movements		Westbound Movements	
Hour	Passenger	Freight	Passenger	Freight
4-5	4 trains to Q.V. 4 trains to Rosedale		3 trains from Q.V. 3 trains from Rosedale	
5-6	5 trains to Q.V. 5 trains to Rosedale		4 trains from Q.V. 5 trains from Rosedale	
6-7	4 trains to Q.V. 3 trains to Rosedale		3 trains from Q.V. 4 trains from Rosedale	
7-8	2 trains to Q.V. 2 trains to Rosedale	Long Island City Local from Yard A	3 trains from Q.V. 3 trains from Rosedale	
8-9	2 trains to Q.V. 2 trains to Rosedale		2 trains from Q.V. 2 trains from Rosedale	
9-10	2 trains to Q.V. 2 trains to Rosedale	Eastbound Hauler from Yard A to Hicksville and Ronkonkoma	2 trains from Q.V. 2 trains from Rosedale	
10-11	1 train to Q.V. 1 train to Rosedale		1 train from Q.V. 1 train from Rosedale	
11-Midnight	None		None	

4.3.1(b) Physical Relocations

Little trackwork modification and no physical relocation are necessary to provide reliable Montauk Transfer freight service between Fresh Pond, Yard A and Jamaica on the Montauk Branch. Bliss Interlocking must be reconfigured to eliminate a one-track bottleneck on the Montauk Cutoff route to Long Island City and approximately 100 feet must be added to the Laurel Hill Third Track in Maspeth. The two tracks of the Montauk Branch and Montauk Cutoff must be equipped with an electrified third rail.

Most Montauk Branch freight sidings (Figure A.10-1 in Appendix A.10) already contain track configurations that permit flexible manipulation of freight cars clear of the two main running tracks. Simultaneous off-peak Queens-oriented service and local freight delivery to all active customers is possible after the installation of four sets of crossovers, shown in Figure A.10-2.

4.3.1(c) Freight Classification Facilities

Classification of freight cars bound for Long Island customers will continue at Long Island City's Yard A in the Montauk Transfer alternative. Twenty classification tracks, adjacent to AMTRAK's Sunnyside Yard passenger train complex, are used by the LIRR.

4.3.1(d) Sharing of Right-of-Way or Trackage

Montauk Transfer passenger and LIRR freight trains will operate on the same Montauk Branch tracks during the same time periods. For capacity reasons, freight trains will not operate from 6:30 to 9:30 AM and 3:30 to 6:30 PM.

4.3.1(e) Impacts on Transit Service

The operation of LIRR freight trains on the Montauk Branch during the midday and evening will not affect the running times or reliability of Montauk Transfer passenger trains.

4.3.1(f) Impact on Waterborne Freight

Near the western end of the LIRR Montauk Line in Long Island City, the railroad crosses a bulkheaded waterway known as Dutch Kills. This waterway branches off in a northerly direction from Newtown Creek and serves as the way for waterborne freight delivery to several industrial customers along its 3,000 foot length. The railroad line crosses Dutch Kills on a lift bridge which is opened at prearranged times to permit passage of barges. Rail service on the Montauk Line is currently light; therefore, coordination of bridge openings with train schedules is not a difficult problem.

To assess future maintenance of waterborne freight deliveries via Dutch Kills for the two Montauk alternatives, four suboptions for the railroad bridge crossing were considered:

- Maintain the existing movable bridge operation
- Close the bridge to water traffic (with purchase of shipping rights)

- Construct a high-level railroad bridge
- Restrict water traffic to off-peak transit hours.

Evaluation of these suboptions considered customer freight delivery needs and resulting water traffic volumes, scheduling and operation of subway and rail freight service, and construction feasiblity. Based on these considerations and on discussions with the U.S. Coast Guard, it is proposed that water traffic will be limited to off-peak transit hours. It has been determined that low-tide water depths are such that the waterway is navigable at all times.

Background information on the investigation of the Dutch Kills bridge cross suboptions and related discussion with the Coast Guard are included in the Technical Supplement to this DEIS.

4.3.2 Montauk/Archer Alternative

4.3.2(a) Description of Proposed Service Plan

The Montauk/Archer Subway Connection utilizes the Montauk Branch from a junction with the Jamaica Avenue Elevated line at Richmond Hill to the Montauk Cutoff and Yard A where the connection joins the 63rd Street line. Through subway trains operate from Parsons Boulevard Station in Jamaica to Manhattan via the Montauk Branch, but, unlike other TA lines, service is not provided during the midnight hours.

Two subway services operate on the Montauk/Archer line: B/K trains to Sixth Avenue and QB trains to Broadway-Seventh Avenue. In the peak hours, twelve B/K and six QB trains operate. In the midday hours, six B and no QB trains operate each hour. After the evening peak period, five B trains operate on the line each hour in each direction. Service to and from Manhattan terminates at the Thomson Avenue Station in Long Island City between 11:00 PM and 5:30 AM.

The LIRR continues to deliver freight to industries along the Montauk Branch and uses the line to move through freight bound for eastern Long Island.

Table 4-18 shows the hourly subway (B/K and QB) trains and freight trains operating on the Montauk Branch in each direction. In the current 1984 LIRR freight schedule, ten trains operate daily. When freight is classified at Fresh Pond, a Fresh Pond to Yard A round trip is no longer needed, so that eight daily LIRR freight trains are shown in Table 4-19.

The three daily diesel passenger trains will be withdrawn in the Montauk/Archer alternative, resulting in the complete loss of rail passenger service at the Penny Bridge and Haberman stations. In addition, the current Glendale station location loses rail passenger service, but the Glendale community would be served by the new Montauk/Archer stations at Woodhaven Boulevard and Fresh Pond Road. Current LIRR Montauk Branch diesel passenger equipment train movements are rerouted via the Main Line.

The construction of a third freight-only track south of the two existing tracks and the provision for daytime access to Yard A freight customers permit daytime delivery of 92 percent of the Montauk Branch carloads. On an annual basis, 1,135 carloads must be delivered during times when transit vehicles are not operating (11:00 PM to 5:30 AM).

Virtually all Montauk Branch customers receive freight at their preferred time in the Montauk/Archer alternative. However, six customers located in Long Island City and Maspeth would receive their freight at night (11:00 PM to 5:30 AM) instead of during the preferred evening hour (6:30 PM to 10:30 PM). In addition, Gallo Wine, which prefers a nighttime delivery so that workers can unload the freight cars for daytime wine distribution, would receive freight in the morning.

4.3.2(b) Physical Relocations

A non-electrified third track between the proposed Fresh Pond classification yard and Bliss Interlocking in Long Island City is required for freight movements in the Montauk/Archer alternative. Bliss must be reconfigured to permit an at-grade crossing of the two Montauk Cutoff tracks so that freight trains can access the Main Line Cutoff and eastern Long Island. These changes to the Montauk Branch track configuration are shown in Figure A.10-3.

The third freight-only track, located south of the two existing Montauk Branch tracks is an amalgamation of the Bushwick Branch, the Maspeth Yard, the Laurel Hill Side Track and several unused Blissville sidings. New bridge structures are required for the third track at Grand Street and Flushing Avenue.

4.3.2(c) Freight Classification Facilities

In the Montauk/Archer alternative, it is necessary to relocate the railroad's freight classification activity to Fresh Pond. The move is required because the Transit Authority requires a 290-car subway yard along the Montauk/Archer route, and the existing classification site—Yard A—is the only suitable location.

Fresh Pond contains sufficient freight classification capacity for the car volumes currently handled by the LIRR as well as the higher volumes handled in 1980. The facility, after some reconfiguration and track additions, would have thirteen tracks capable of handling 324 cars.

The West Yard's present 0.55 percent downgrade is leveled out by eliminating the West Ladder, filling under Tracks 2 through 5 and installing bumper blocks at the track ends. In the East Yard, Tracks 11 to 14 are added to increase car classification and storage capacity. These tracks are shown in Figure A.10-3.

Table 4-19 displays Fresh Pond Yard track assignments and the projected maximum daily number of car couplings. These car coupling numbers are shown for 1980 and 1983 LIRR car volumes. The 1980 volumes represent the "high-case" freight movements. Those tracks in Table 4-19 with an "E" prefix are located east of the Myrtle Avenue Elevated; those with a "W" prefix are west.

Most classification activity will occur during the morning and early afternoon. The inbound Conrail train is expected to continue arriving at the Fresh Pond interchange track at approximately 7:00 AM. A LIRR switcher will immediate-

TABLE 4-18
MONTAUK-ARCHER ALTERNATIVE
MONTAUK BRANCH SUBWAY AND FREIGHT TRAIN ACTIVITY

	Eastbound Movements		Westbound Movements	
Hour	Subway	Freight	Subway	Freight
Midnight-1	0 B/K[1] trains 0 QB[2] trains	Long Island City Local to Fresh Pond Jct. Yard	0 B/K trains 0 QB trains	
1-2	0 B/K trains 0 QB trains		0 B/K trains 0 QB trains	
2-3	0 B/K trains 0 QB trains		0 B/K trains 0 QB trains	
3-4	0 B/K trains 0 QB trains		0 B/K trains 0 QB trains	
4-5	1 B/K train 0 QB trains		1 B/K train 0 QB trains	Westbound Hauler from Ronkonkoma and Hicksville to Fresh Pond Jct. via Richmond Hill
5-6	4 B/K trains 0 QB trains		4 B/K trains 0 QB trains	
6-7	4 B/K trains 3 QB trains		4 B/K trains 0 QB trains	
7-8	12 B/K trains 6 QB trains		12 B/K trains 6 QB trains	
8-9	12 B/K trains 3 QB trains		12 B/K trains 6 QB trains	Bushwick/Fresh Pond Local from Fresh Pond Jct. Yard
9-10	4 B/K trains 0 QB trains		4 B/K trains 0 QB trains	Bay Shore or Garden City Local from Fresh Pond Jct. to Main Line
10-11	6 B/K trains 0 QB trains		6 B/K trains 0 QB trains	
11-Noon	6 B/K trains 0 QB trains		6 B/K trains 0 QB trains	
Noon-1	6 B/K trains 0 QB trains		6 B/K trains 0 QB trains	
1-2	6 B/K trains 0 QB trains	Bushwick/Fresh Pond Local to Fresh Pond Jct. Yard	6 B/K trains 0 QB trains	

[1] B/K subway trains to Sixth Avenue Line, Manhattan. B trains operate through to Brooklyn, K trains terminate at Second Avenue, Manhattan.
[2] QB Subway trains to Broadway-Seventh Avenue BMT Line, Manhattan.

TABLE 4-18 (Continued)
MONTAUK-ARCHER ALTERNATIVE
MONTAUK BRANCH SUBWAY AND FREIGHT TRAIN ACTIVITY

Hour	Eastbound Movements Subway	Eastbound Movements Freight	Westbound Movements Subway	Westbound Movements Freight
2-3	5 B/K trains 0 QB trains		5 B/K trains 0 QB trains	
3-4	5 B/K trains 0 QB trains	Bay Shore or Garden City Local from Main Line to Fresh Pond Jct.	5 B/K trains 0 QB trains	Fresh Pond Local to Yard A
4-5	5 B/K trains 3 QB trains		5 B/K trains 0 QB trains	
5-6	5 B/K trains 6 QB trains		5 B/K trains 6 QB trains	
6-7	6 B/K trains 3 QB trains		6 B/K trains 6 QB trains	Long Island City Local from Fresh Pond Jct. Yard
7-8	5 B/K trains 0 QB trains		5 B/K trains 0 QB trains	
8-9	5 B/K trains 0 QB trains		5 B/K trains 0 QB trains	
9-10	5 B/K trains 0 QB trains		5 B/K trains 0 QB trains	Eastbound Hauler from Fresh Pond Jct. to Hicksville and Ronkonkoma via Main Line Cutoff
10-11	2 B/K trains 0 QB trains		5 B/K trains 2 QB trains	
11-Midnight	0 B/K trains 0 QB trains		0 B/K trains 0 QB trains	

TABLE 4-19
MONTAUK-ARCHER ALTERNATIVE
FRESH POND YARD TRACK ASSIGNMENTS AND CAR VOLUMES

Track	Assignment	1983[1] Car Volume	1980[2] Car Volume
1E	Train assembly, access to West Yard	-	-
2E	Train breakdown	-	-
3E	Wyandanch, Deer Park, Farmingdale Sidings	17	27
4E	Brentwood, Central Islip Sidings	13	20
5E	Bay Shore and Montauk Branch East Sidings	12	19
6E	Ronkonkoma, Riverhead and Main Line East Sidings	10	16
7E	Port Jefferson Branch Sidings	11	18
8E	Garden-Mitchell Field Secondary Sidings	7	11
9E	Movement to/from Conrail	-	-
10E	Hicksville Sidings	5	8
11E	Holban Yard, Richmond Hill Sidings	4	7
12E	Locomotive and Caboose Storage	-	-
13E	Corona and Port Washington Sidings	2	4
14E	Crippled Car Storage	-	-
2W	Long Island City Secondary Track C Sidings	30	47
3W	Blissville and Maspeth Sidings	8[3]	13[3]
4W	Yard A Sidings (International Salt)	10[4]	16[4]
5W	Yard A Sidings (Gallo and Ronzoni)	14	22
6W	Access to private sidings	-	-
		143	228

[1] Maximum volume for the week July 8 to 15, 1983.
[2] 155 percent of 1983 volume.
[3] Includes carloads for Phelps-Dodge, now closed.
[4] No International Salt cars were handled during this week, figure shown is a typical Winter maximum.

ly move cuts of up to 23 cars down the East Wye (Track 9) to the East Yard Lead, where the switcher will push the cars into East Yard Track 2. The 23 cars will then be classified on the appropriate East and West Yard tracks; East Yard Track 1 is used to gain access to the West Yard. The switcher will move additional cuts of 23 cars down the East Wye until all inbound cars are processed.

4.3.2(d) Sharing of Right-of-Way or Trackage

During the peak passenger transit periods of the day (6:30 to 9:30 AM and 3:30 to 6:30 PM), the recommended Montauk/Archer track configuration will operate as two separate railroads: the TA will use both Montauk Branch tracks and LIRR freight trains will be limited to shuttling between Fresh Pond and Bliss Interlocking on the freight-only third track.

The proposed third freight-only track as well as the addition of diamond crossings to northside freight sidings permit freight and subway train movements on separate tracks. Except for at-grade freight train crossings of the two subway tracks during off-peak times, there is no integration of TA and LIRR trains in the Montauk/Archer alternative.

At times when subway trains are not operating on the Montauk Branch (approximately 11:00 PM to 5:30 AM), LIRR through and local delivery freight trains may operate on the branch east of Fresh Pond.

To provide Montauk/Archer service, Transit Authority trains would operate on the LIRR Montauk Branch using trackage rights. Trackage rights agreements, in effect between many railroads in the United States, permit a crew of one operating entity to operate their train over the track of the host operating entity. The host operating entity receives financial compensation for the movement of trains, normally based on the number of cars or tons moved.

A trackage rights agreement for the Montauk Branch would clearly delineate the operating and maintenance responsibilities of the various TA and LIRR staffs. TA subway trains would be staffed by a TA motorman and conductor, while LIRR freight trains would be staffed by an engineer, a conductor and two brakemen.

The LIRR, which would retain ownership of the line, would hold responsibility for all Montauk Branch operations. The existing Bliss and Pond Towers would continue to control the line and be manned by LIRR personnel. Their actions would continue to be coordinated by the LIRR Movement Bureau in Jamaica.

The land beneath the Montauk/Archer Stations sites located at Thomson Avenue, Fresh Pond, Woodhaven Boulevard and Richmond Hill, as well as the existing Fresh Pond and Richmond Hill structures, would be deeded to the TA. Transit Authority token clerks would be responsible for fare collection, the TA Stations Department would be responsible for cleaning and maintenance, and TA police would be responsible for security. None of the existing Montauk Branch stations between Jamaica and Long Island City are currently manned by LIRR ticket agents, nor do they receive any routine cleaning. Thus, the sale by the LIRR of the four station sites represents no loss of jobs or responsibilities by LIRR employees.

The Yard A site would also be sold by the LIRR to the TA for use as a subway storage yard. The LIRR would retain ownership of the land and trackage necessary for Long Island City freight deliveries. All of the existing LIRR yardmaster and classification jobs associated with Yard A would be transferred to the new LIRR classification site, Fresh Pond. Once the Yard A site is rebuilt for TA train storage, the train movement and maintenance positions would be filled by TA personnel.

4.3.2(e) Impacts on Transit Service

The Montauk/Archer alternative freight operating plan would affect the running time and reliability of TA subway trains. Assuming the high-case 1980 freight volumes, subway trains would be delayed an average of 4.8 seconds because of freight movements on the Montauk Branch. Most subway trains would not experience delays; however, some midday and evening trains would be delayed up to six minutes.

5.0 ENVIRONMENTAL CONSEQUENCES

5.1 Land Use and Socioeconomic Impacts

The five proposed alternatives will have varying long term land-use and socioeconomic impacts throughout Queens. These will result from both permanent changes in transportation services and short term impacts resulting from construction activities which implement these changes. The following section assesses the probable impacts of the five alternatives. The comparative socioeconomic impact of the alternatives are presented in Table 5-1.

The alternatives will have impacts primarily on regional accessibility and mobility which may, in turn, have broader land use and socioeconomic effects. However since transit accessibility and mobility are already integral features of the study (see Chapter 4) and the Borough of Queens is essentially built up, these impacts are not likely to stimulate substantial secondary changes in environmental conditions.

The following section is therefore primarily focused on local impacts of the five alternatives. The discussion is by alternative and is arranged by three main topics -- land use and secondary development impacts, community impacts (primarily focused on social impacts) and economic impacts.

5.1.1 No Additional Construction

5.1.1(a) Land Use and Secondary Development Impacts

This alternative will have no substantial impacts on land use beyond those which have already occurred. No permanent land use impacts are expected to result from the extension of the 63rd Street Tunnel to Long Island City since the remaining construction will be completed entirely underground. Other sections of this alternative -- the Archer Avenue subway and the Hillside Connector, which are also nearing completion -- will not have land use impacts beyond those which have already or which will occur as part of the existing construction.

The extension of the 63rd Street Tunnel passes under a substantially developed community area and is not likely to have notable secondary effects on residential development. Further, since the extension will be a stub end of the line, with only one station in Queens (the 21st Street Station) the new transit facility is not expected to have significant secondary effects on commercial development. Finally, two of four street corners, flanking the 21st Street Station, are occupied by the Queensbridge Houses public housing project and are effectively preempted from potential redevelopment.

The Archer Avenue subway and the removal of the Jamaica Avenue Elevated from the vicinity of 124th Street to 168th Street are part of a comprehensive program to improve and restore the Jamaica Avenue commercial strip and to revitalize downtown Jamaica. By itself, the Archer Avenue subway, which replaces the Elevated, but provides no new service, is unlikely to have strong growth inducing influences. However, the subway will complement on-

TABLE 5 – 1

COMPARATIVE SOCIOECONOMIC IMPACTS

SOCIOECONOMIC FACTOR	No Additional Construction	Queens Bypass Express	Queens Blvd Local Connection	Montauk Transfer	Montauk/ Archer
LANDUSE AND SECONDARY DEVELOPMENT IMPACTS					
Land use	No permanent land use impacts beyond those which have already occurred as part of the Phase I program.	Property takings will result in land use changes in selected locations along the alignment.	Land use imparts on two parking lots in Long Island City and on several properties along Northern Boulevard caused by construction.	Land use changes -- resulting from construction of transfer station in Sunnyside Yards, renovation of stations in Southeast Queens, elimination of grade crossings and construction of bridges over alignment -- will be greater than other build alternative (except Montauk/Archer).	Land use impacts are similar to Montauk Transfer option. Additional impacts result from construction of new station at Fresh Pond Road and Woodhaven Boulevard, demolition of El along a 3 ½ mile stretch of Jamaica Avenue in Woodhaven and Richmond Hill.
Secondary Development	No secondary development impact.	Possible development in Long Island City around new Northern Boulevard station. Market conditions still dominate.	No major stimulative effects on development.	Some possible infill residential development in Southeast Queens. Limited potential for new commercial development.	Prospects for additional residential activity in communities in CD5, particularly in Ridgewood. New large scale residential development and substantial new commercial development are unlikely.

TABLE 5 - 1 (Continued)

COMPARATIVE SOCIOECONOMIC IMPACTS

SOCIOECONOMIC FACTOR COMMUNITY IMPACTS	No Additional Construction	Queens Bypass Express	Queens Blvd Local Connection	Montauk Transfer	Montauk/ Archer
Residential Displacement	None	Twelve residential properties containing 50 units will have to be displaced.	None	One residential unit will be displaced.	Same as Montauk Transfer
Community Cohesiveness	No physical barriers to community cohesiveness are created. Removal of El in Jamaica removes a formidable physical and physchological barrier to community renewal.	Impacts during construction as described below.	No impact.	Strong negative impact perceived by the community resulting from assorted physical impacts -- noise, vibration, added security Features and electrification.	Similar to Montauk Transfer. New stations at Woodhaven Blvd. and Fresh Pond Road are perceived in community as potentially disruptive. Demolition of El on Jamaica Avenue will remove a strong existing physical barrier.

TABLE 5 - 1 (Continued)

COMPARATIVE SOCIOECONOMIC IMPACTS

SOCIOECONOMIC FACTOR	No Additional Construction	Queens Bypass Express	Queens Blvd Local Connection	Montauk Transfer	Montauk/ Archer
Safety and Security	New stations are designed to maximize safety and security of transit riders. Removal of El in Jamaica improves safety condition on Jamaica Avenue	No significant effect on existing safety and security conditions. New and expanded services runs along an existing busy alignment which is secure.	Community concern expressed about passageway between Court Square and 23rd/Ely Station. Passageway will be designed to minimize safety problems.	Although the line will be electrified and the use will be greatly increased, improved security barriers should prevent illegal crossings of the alignment which are now prevalent and would improve safety conditions. Improvements to existing stations will also make them safer.	Similar to Montauk Transfer except for greater frequency of trains.
Transportation Services	New Stations will be more accessible to elderly and handicapped. No new services provided. Little relief of overcrowding on Queens Blvd. line.	Significant new transportation service to previously undeserved areas and relieves overcrowding on E and F line to a greater extent than any other option. Disruption during construction to LIRR Main Line service and to Queens Blvd. and Astoria Lines.	Relieves overcrowding on E and F line. More direct service to Manhattan and for residents of CD3 and CD4. Termination of GG service at Court Square requiring transfer to Queens Blvd. line may inconvenience some riders. Disruption during construction to Queens Blvd. and Astoria Lines.	Vastly improved service to Southeast Queens. Greatest increase in geographic coverage of all alternatives. Little relief of overcrowding on Queens Boulevard line. Disruption to LIRR Main Line and Montauk and Atlantic branches during construction and to Queens Blvd., Astoria and Flushing lines.	Improved service to CD5 and CD9. Greatest savings in travel time over baseline conditions of all alternatives. Some inconvenience to J train riders in Woodhaven and Richmond Hill caused by demolition of El and elimination of several stations. Some relief to overcrowding on Queens Blvd. line. Disruption to Queens Blvd., Astoria and J line during construction.

TABLE 5 – 1 (Continued)

COMPARATIVE SOCIOECONOMIC IMPACTS

SOCIOECONOMIC FACTOR	No Additional Construction	Queens Bypass Express	Queens Blvd Local Connection	Montauk Transfer	Montauk/ Archer
Visual Quality	Removal of El in Jamaica will improve visual qulaity and surrounding area. No other visual quality impact.	Expanded number of trains along already busy LIRR mainline will provide minor change in existing visual conditions.	No permanent impact.	Substantial change in visual quality conditions. Improvement in trackbed and track areas. More formidable security and noice barriers erected along alignment, blocking views in certain areas. Greatly increased frequency of trains will also affect visual conditions. Major visual impacts resulting from construction of bridges over alignment.	Similar to Montauk Transfer Demolition of El on Jamaica Avenue will significantly improve existing visual quality conditions.
Community Facilities	None	Construction would require underpinning of JHS 190 on Yellowstone Blvd.	No impacts.	Increased noise levels near Christ the King High School.	Similar to Montauk Transfer.

TABLE 5 – 1 (Continued)

COMPARATIVE SOCIOECONOMIC IMPACTS

SOCIOECONOMIC FACTOR	No Additional Construction	Queens Bypass Express	Queens Blvd Local Connection	Montauk Transfer	Montauk/ Archer
Construction Impacts	No additional constitution impacts beyond those which have already occurred.	Substantial impacts in vicinity of Yellowstone and Queens Boulevard for a period of 3½ years.	Disruption to businesses and traffic in vicinity of Northern Boulevard during a two year construction period. Displacement of parking will inconvenience commuter.	Some temporary construction-related impacts along the alignment, particularly for construction of bridges crossing the alignment.	Similar to Montauk Transfer. Demolition of El will create some additional temporary disruption.
Construction impacts	No additional impacts.				
Number of construction jobs (person years of employment)	N.A.	5,600	710	2,460	3,270
Total number of jobs (direct and indirect)	N.A.	11,350	1,470	4,970	6,590
Tax revenue to NYS and NYC (millions 1983 $)	N.A.	$34.8	$4.5	$15.3	$20.3

TABLE 5 - 1 (Continued)

COMPARATIVE SOCIOECONOMIC IMPACTS

SOCIOECONOMIC FACTOR ECONOMIC IMPACTS	No Additional Construction	Queens Bypass Express	Queens Blvd Local Connection	Montauk Transfer	Montauk/ Archer
Operations and Maintenance					
Direct new permanent jobs	260	691	443	965	542
Total new permanent jobs (direct and indirect)	370	990	620	1,350	770
Tax revenues to generated/year (millions 1983 $)	$1.0	$2.8	$1.6	$3.6	$2.1
Business Displacement Disruption	None	Twenty-nine businesses employing a total of 224 workers could be potentially - displaced. Disruption to businesses along Yellowstone Boulevard during construction.	Ten businesses with 378 employees could potentially be displaced. Some additional disruption due to construction activity on Northern Boulevard.	Three businesses with 81 employees could potentially be displaced. Several other businesses will be disrupted due to restructured access or elimination of parking areas.	A total of 15 firms employing 163 workers could be displaced under this alternative. There were some additional disruption to businesses along Jamaica Avenue in Richmond Hill and Woodhaven due to demolition of El. This will be temporary.

TABLE 5 - 1 (Continued)

COMPARATIVE SOCIOECONOMIC IMPACTS

SOCIOECONOMIC FACTOR	No Additional Construction	Queens Bypass Express	Queens Blvd Local Connection	Montauk Transfer	Montauk/ Archer
Secondary Development	No significant stimulative effects on commercial/industrial development.	Substantial new development is unlikely. Possibly improves opportunities for redevelopment in Long Island City near hew Northern Boulevard station.	Substantial new development is unlikely.	Substantial new development is unlikely.	No significant new commercial development. Improved environment for business investment on Jamaica Avenue resulting from dissolution of El.
Freight Operations	No impacts.	No major impacts. A team siding used by Supro Building Products Corporation will be displaced by construction activity.	No impacts.	No significant impact. All Montauk Branch customers will continue to receive carload deliveries at their preferred times. Some delays caused by construction.	Potential greater impacts on freight operations than other operations. Because of construction of a third, frieght-only train, existing peak hour freight deliveries will be accommodated with few changes to existing delivery schedules. Some delays caused by construction.

going developments which include the new Social Security Administration building, the new campus for York College and the conversion of the former Gertz Department Store to an office building. The Hillside Connector will provide improved transit service by providing Jamaica residents better access to express service on the Queens Boulevard line. The area around the new Jamaica Hospital Station on the Hillside Connector, where impacts might otherwise be expected, is already fully developed. Some limited redevelopment could, however, occur on the blocks north of the station.

5.1.1(b) Community Impacts

Residential Displacement. This alternative will not require displacement of any residential uses or other property.

Community Cohesiveness. No physical barriers within the community will be created. Rather the removal of the Elevated in Jamaica will eliminate what has historically been a formidable physical and psychological barrier to community renewal and will serve to strengthen community identity.

Safety and Security. The new stations at 21st Street in Long Island City, at Jamaica Hospital and along the Archer Avenue subway have been designed to maximize safety and security of transit riders. The stations will be well-lit, be provided with clear and attractive signage and passenger waiting zones. Increased auto and feeder bus traffic around the new stations (see Arterials and Local Streets section of Chapter 4) is not significant and is not expected to affect neighborhood security. The removal of the Elevated will provide a wider and less hazardous right-of-way, making Jamaica Avenue safer for motorists. The elimination of dark shadows, columns and dark corners resulting from the demolition of the Elevated will help to create a safer pedestrian environment.

Transportation Services. Overall the improvements will result in more comfortable transportation service for the communities it serves, but will not relieve overcrowding on the Queens Boulevard line (see Chapter 4 for details). The provision of elevators and other improvements in these new stations will make the stations barrier free to the elderly and handicapped.

Visual Quality. Extension of the 63rd Street Tunnel will have no visual quality impacts since all improvements will be underground. In Jamaica, the removal of the Elevated will substantially improve visual quality both on the Jamaica Avenue commercial strip and in the surrounding neighor borhood. Changes in the visual quality of the community resulting from the new elevated structure of the Archer Avenue subway have already taken place.

Community Facilities. This alternative will have little impact on community facilities beyond that which has already occurred.

Construction Impacts. For the most part, work involving construction impacts has already occured. Additional construction necessary for the completion of the 63rd Street Tunnel is on electrical, signal and other operating systems underground and will not affect local communities. Most surface work for the Hillside connector and Archer Avenue subway is also complete.

5.1.1(c) Economic Impacts

Construction Impacts. The construction associated with this alternative is nearing completion and will not generate substantial economic benefits beyond those which have already occurred.

Operations and Maintenance. Total additional operating costs for the No Additional Construction alternative are estimated at $13.6 million (1983). The new services will require additional Transit Authority personnel. A total of 260 new permanent jobs will be created (see Chapter 2 for details). Based on typical economic multipliers for sectors of the New York City and New York State economies developed from similar expenditures (New York State Office of Planning Coordination), additional permanent jobs could be generated in New York City and State for a total of 370 new permanent jobs. Tax revenues generated by the direct and indirect activity will be approximately $ 1 million per year. The largest expected category will be personal income taxes on wages and salaries.

Business Displacement/Disruption. No business or employment displacement beyond what has already occurred will result from this alternative.

Secondary Development. While improved transportation service provided by this alternative may improve the overall business climate in Long Island City and in Jamaica, the new service is not expected to have significant stimulative effects on new development activity. The 63rd Street Tunnel expansion may improve access to some industrial uses in Long Island City but there are few "soft" sites which are likely to be developed in that area. The removal of the Elevated along Jamaica Avenue from 128th Street to Sutphin Boulevard may support commercial revitalization efforts on that shopping strip. However, the dismantling of the Elevated is essentially a visual improvement which may encourage additional investment but which must be accompanied by other neighborhood revitalization activities to have a substantial economic impact. The improvements will support on-going development efforts in downtown Jamaica but in itself will not provide the impetus for major new development. Since no major secondary development is expected, there will be no additional impacts on services or on the tax base.

Impact on Freight Operation. This alternative will not significantly impact freight operations of the Long Island Rail Road.

5.1.2 Queens Bypass Express

5.1.2(a) Land Use and Secondary Impacts

This alternative involves extension of the 63rd Street Tunnel along 41st Avenue east of 29th Street across Northern Boulevard to the Sunnyside Yards and along the LIRR Main Line right of way to Yellowstone Boulevard in Forest Hills. At that point, the new line leaves the Main Line to extend under

Yellowstone Boulevard, connecting with the 71st-Continental Avenues Station of the Queens Boulevard line.

The major land use changes resulting from this alternative are caused by numerous property takings needed to construct and operate the improvements. Of the three new stations proposed as part of this alternative, two, Woodside and 71st-Continental Avenues, are expansions of existing stops. The one completely new station at Northern Boulevard, would provide a pedestrian connection to the existing IND Queens Plaza Station. The station would be underground and would not result in any permanent land use changes on the surface except for station entrances.

The opening of a new station at Northern Boulevard in Long Island City could provide a focus for new development on nearby properties. However, any new growth in this area would likely be modest in scale given the economics of building and current and forseeable market conditions. Long Island City is a stable industrial area, and recent efforts to recast the image of the area in a different mold, e.g., as a back office district, have run into difficulties; as evidenced by the Thomson Place project.

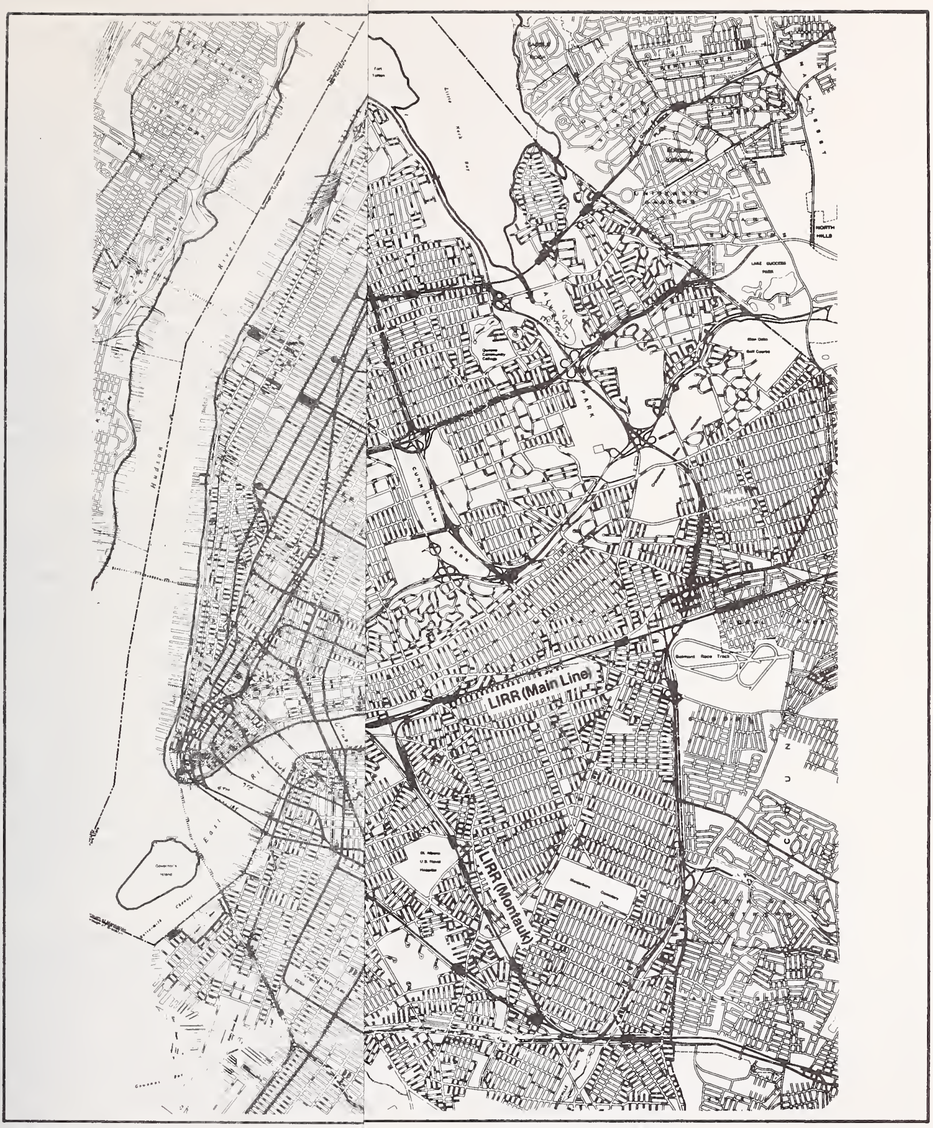
Redevelopment possibilities around the redeveloped Woodside Station, which would become part of the existing LIRR and IRT subway station at that location, are limited by the fully built-up character of the area. Similarly, the area of the 71st-Continental Avenues Station is substantially developed. Potential new development in this area would confront problems of assemblage and rezoning.

5.1.2(b) <u>Community Impacts</u>

<u>Displacement</u>. Construction of this alternative will require substantial residential relocation. A total of 24 residential properties will be involved; half will require displacement of residents, and half will be only partial takings of land -- like backyards and garages without any takings of residential buildings and therefore not involving displacement. Figure 5-1 shows the general locations of the areas where residential property acquisitions would be necessary for this alternative, as well as for the other alternatives.

The July 1975 <u>Phase I Report</u> on the Queens Bypass Express identified 24 families which would be displaced by the option. All the displaced residential properties identified by that study were one, two and three family homes except for a nine-unit structure at 6201 Woodside Avenue (Block 1294, Lot 23). Among the other affected buildings were two three-family houses on 65th Place, two two-family houses on 54th Street and 65th Place, and five one-family houses on 60th and 69th Streets.

Since 1975, some residential development on properties to be taken has increased the number of families which could be displaced. An eight-unit apartment house at 3970 62nd Street in Woodside (Block 1294, Lot 82) which was fire-gutted in 1975 is now occupied. In 1983, a 58-unit condominium development was built on Calamus Avenue along the Main Line (Block 2467, Lot



Legend

△ Areas where proper·ty acquisitions in whole or in part will be necessary f Queens Bypass Express

* In these areas, displacement of families may be necessary.

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Scale in Feet

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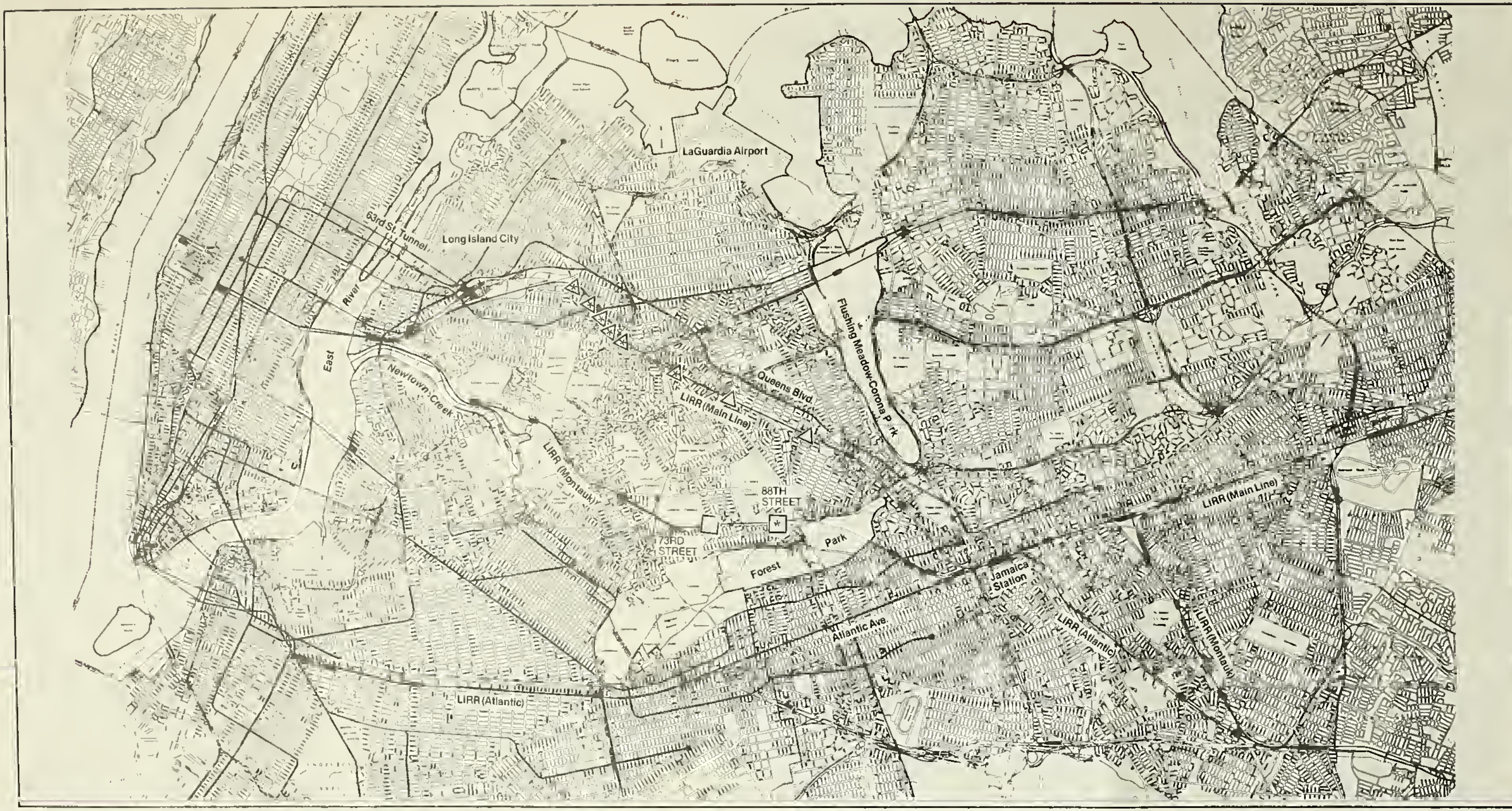
AREAS WHERE RESIDENTIAL PROPERTIES WILL BE ACQUIRED IN PART OR IN WHOLE FOR THE ALTERNATIVES

Figure 5-1

Queens Subway Options Study



Legend

△ Areas where property acquisitions in whole or in part will be necessary for Queens Bypass Express

* In these areas, displacement of families may be necessary.

□ Areas where property acquisitions in whole or in part will be necessary for Montauk Transfer and Montauk Archer

0 6000 Scale in Feet

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Figure 5-1

AREAS WHERE RESIDENTIAL PROPERTIES WILL BE ACQUIRED IN PART OR IN WHOLE FOR THE ALTERNATIVES

Queens Subway Options Study

255 in 1975, now Lot 1001-1051). One end of an 18-unit building in the complex is very close to where the right-of-way would be expanded. Without knowing about the structure of the 18-unit building, it is impossible to say if only a few units closest to the right-of-way expansion could be demolished. Therefore, assuming a worst case situation for this analysis, it is inferred that all 18-units are displaced. The eight-units in Woodside plus the 18 condos, added to the 1975 figure of 24 families displaced, brings the total number of families potentially displaced to 50.

Other property takings involve railroad property along the LIRR Main Line and in the Sunnyside Yards. Railroad properties affected are the LIRR substation at 55th Street, permanent surface, subsurface and access easements in Sunnyside Yards, and the Penn Central Railroad storehouse in Sunnyside Yards. The one institutional property affected is the Catholic War Veterans Meeting Hall at 39-46 61st Street. The meeting hall would have to be relocated. Parklands affected by this alternative are described in Section 5.5.

Community Cohesion. This alternative involves the widening of an existing active railroad right-of-way and substantially expanding the frequency of trains running along the alignment. Crossing the alignment via over and underpasses constitutes a well established community pattern. Improvements will not disrupt those travel patterns. More intrusive noise impacts would also be created due to the increased use of the alignment.

Disruption caused by the construction along Yellowstone Boulevard will affect community cohesion, as described below.

Security. New stations constructed for this alternative would be designed to maintain and/or improve the security which now exists. Expansion of service along the existing LIRR Main Line, which is already heavily utilized, will not alter existing community travel patterns and with safety improvements proposed will not jeopardize but may improve safety conditions. Because of the high volume of trains running along the line and electrification of the facility, people already do not cross the tracks of the Main Line.

Transportation Service. This alternative provides significant new transportation service to previously underserved areas and more than any other alternative reduces overcrowding on the E and F lines. (See Chapter 4 for more details.) It would also provide the second greatest level of time savings over baseline conditions of all the alternatives (after Montauk/Archer). During construction, this alternative would be the most disruptive to transit services of all the alternatives. The Long Island Rail Road Main Line would experience off peak delays for three years and 24 hour speed restrictions for nine months. As with all alternatives, there would also be some temporary disruption to the Queens Boulevard and Astoria lines during construction.

Visual Quality. Proposed improvements involve expansion of an existing right-of-way and station areas. The one completely new station at Northern

Boulevard will be underground. No significant changes in visual quality will result from these activities.

Community Facilities. Neither the construction nor the operation of the alignment will significantly impact community facilities. P.S. 102 (Facility 2 in Table 3-8) is located to the north of the Main Line and is separated from the alignment by Haspel Street. Expansion of the Main Line on the southside will not affect this school. Similarily, P.S. 139 (Facility 8 in Table 3-8) is on the northside of the Main line and is separated from the alignment by several blocks. Construction along Yellowstone Boulevard, which is adjacent to J.H.S. 190 (Facility 9 in Table 3-8) would require underpinning part of the school's foundation to avoid impacts. St. Sebastian School (Facility 2 in Table 3-9) is several blocks from the Main Line. St. Mary's Help of Christians School (Facility 3 in Table 3-9) is adjacent to the alignment, but it is on the northside, the side which will not be expanded. St. Adalbert School (Facility 4 in Table 3-9) is on the southside of the alignment, but is separated from it by 84th Street.

Construction. Impacts on land use and community activity in the vicinity of Yellowstone Boulevard, including congestion, noise, dust and other bothersome effects, resulting from construction activity would be substantial. In this area construction activity would extend for a period of three and a half years. Construction will require either diversion of traffic on Yellowstone Boulevard to one side of the street or the complete closing of the Boulevard in sections and rerouting of traffic to other streets. Adverse impacts can be somewhat minimized by careful control of construction procedures. Construction disruption could have unmitigatable temporary effects on property values and increased turnover in residential rental units along the Boulevard. Construction activity would also disrupt transportation services as described above.

5.1.2(c) Economic Impacts

Construction. Construction of the proposed improvements including the necessary yard and maintenance facility will cost an estimated $659.0 million (1983 dollars).

Based on typical wage and fringe benefit rates for construction labor within New York City, direct employment from construction expenditures is estimated at 5,600 person-years (the equivalent of one employee working one year) for the entire construction period which will start in 1991 and be completed in 1998. In addition to direct employment, total employment resulting from the construction expenditures would include jobs in business establishments providing goods and services to the contractors, and resulting indirect impacts on generated employment. Based on economic multipliers for principal sectors of the New York City and New York State economies developed by the New York State Office of Planning Coordination and on experience from comparable major development projects, total direct and generated employment resulting from the construction expenditures are estimated at a total of about 11,350 person-years of employment within New York State, of which 9,300 person-years of employment are within New York City.

The construction activity will also generate substantial tax revenues for New York State and City. Taking into account indirect expenditures, total economic activity resulting from construction is estimated at $829.0 million in New York State, $623.8 million of which would be spent within New York City. While direct expenditures by the MTA are not taxed, based on aggregate data on economic activity and tax receipts for the New York State and New York City economies developed by the New York City Office of Management and Budget for use in evaluating other development projects, it is estimated that tax revenues from construction activity will equal approximately 4.2 percent of the projects total economic activity in New York State. Of these tax revenues, the largest portion will come from personal income taxes and from sales and corporate taxes on direct and induced economic activity. New York State will receive approximately $25.1 million (72 percent) and New York City will receive approximately $9.7 million (28 percent) of the tax revenues generated by construction. In total, construction of the project is estimated to generate approximately $34.8 million in tax revenues for New York City and New York State.

Other Capital Expenditure. Expenditures for rolling stock required for this alternative are approximately $272.0 million (1983 dollars, exclusive of expenditures for new rolling stock for existing development).

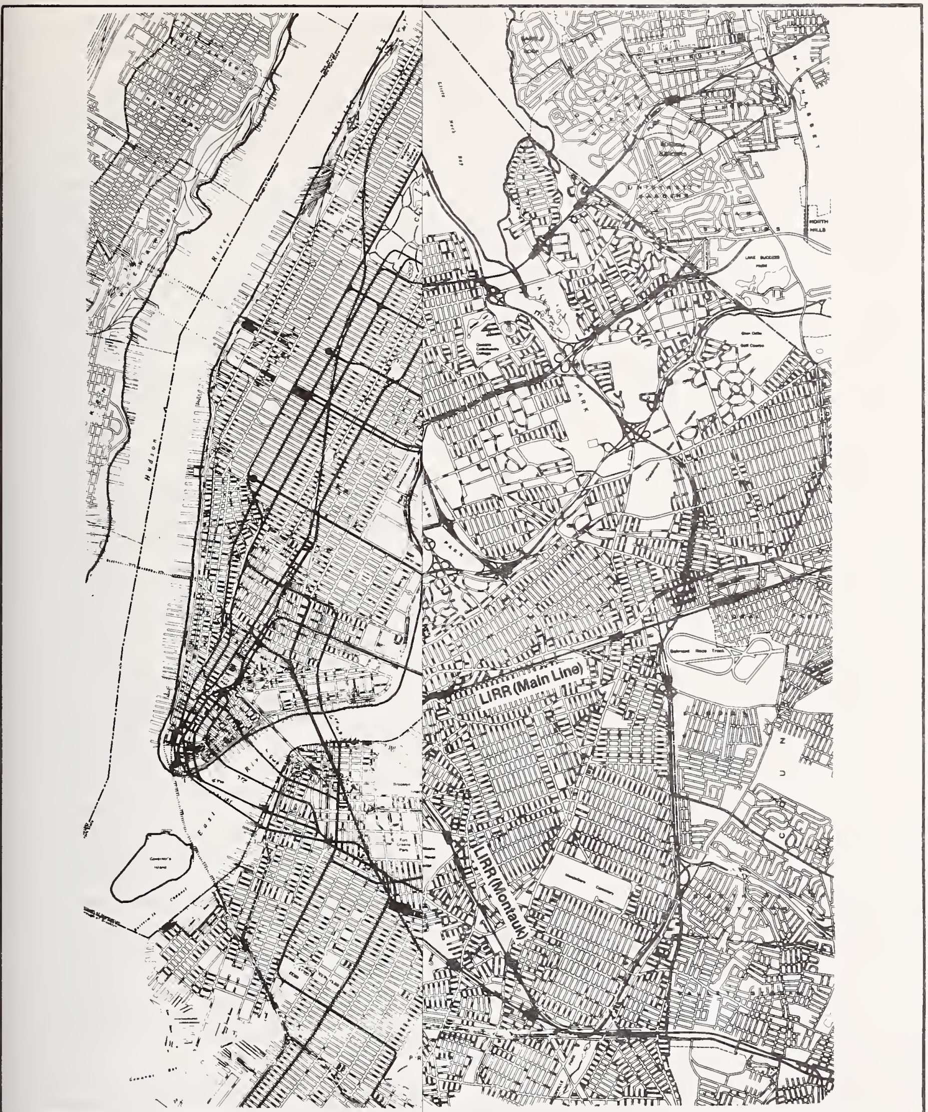
Operations and Maintenance. Total operating costs for the alternative are estimated at $36.27 million (1983) and will require the addition of an estimated 691 new Transit Authority employees (see the Technical Supplement for details).

Based on typical economic multipliers for sectors of the New York City and New York State economies developed from similar expenditures (New York State Office of Planning Coordination), these operations and maintenance expenditures would generate additional jobs, for a total of 990 in New York City and State.

Tax revenues generated by the direct and indirect activity will be approximately $2.8 million per year. The largest expected category will be personal income taxes on wages and salaries.

Business Displacement and Disruption. This alternative will require substantial displacement of existing businesses. Figure 5-2 shows the general locations of the areas where commercial property acquisitions would be necessary for this alternative as well as for the other alternatives. According to the 1975 Phase I Report on the Queens Bypass Express, 46 commercial properties are affected either in whole or in part, including 20 two-car garages on Barnett Avenue and four properties which have residential as well as commercial uses. The 1975 report identified 22 businesses displaced on the commercial properties.

Since 1975, there have been some changes. The former Westinghouse plant on Northern Boulevard (Block 239, Lot 36) has been bought by the Transit Authority. The store and law offices at 29-42 Northern Boulevard (Block 239, Lot 23) have moved,and the firm at 47-07 Barnett Avenue (the Nemac



Legend

△ Areas where properties must be acquired for Queens Bypass Express

* In these areas, displacement of businesses may be necessary.

0 6000
Scale in Feet

△
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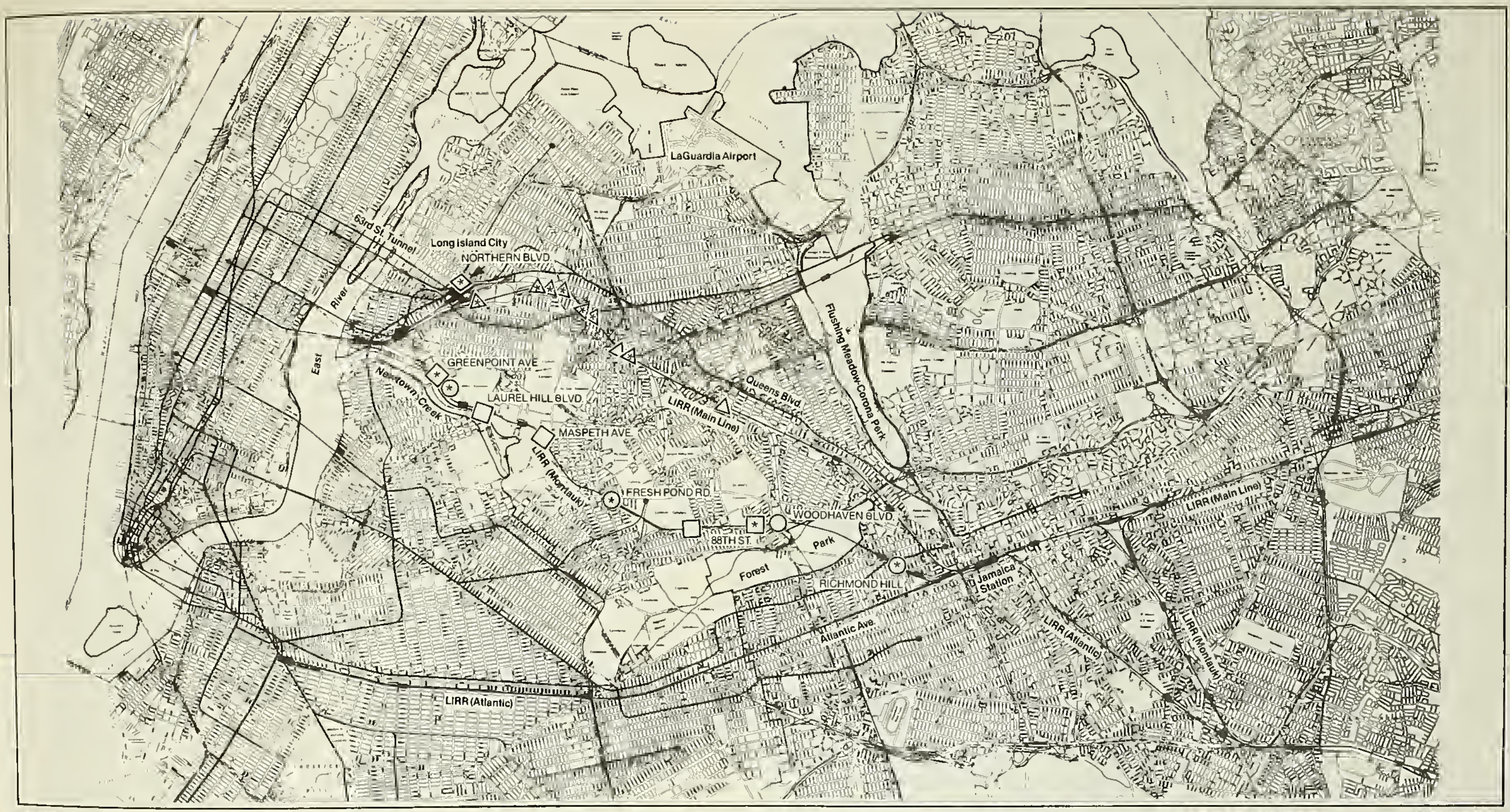
Figure 5-2

AREAS WHERE COMMERCIAL PROPERTIES WILL BE ACQUIRED IN PART OR IN WHOLE FOR THE ALTERNATIVES

Queens Subway Options Study



Legend

△ Areas where properties must be acquired for Queens Bypass Express

* In these areas, displacement of businesses may be necessary

□ Areas where properties must be acquired for both Montauk Transfer and Montauk Archer

◇ Areas where properties must be acquired for Local Connection

○ Areas where properties must be acquired for Montauk Archer

0 6000 Scale in Feet N

Figure 5-2

AREAS WHERE COMMERCIAL PROPERTIES WILL BE ACQUIRED IN PART OR IN WHOLE FOR THE ALTERNATIVES

Queens Subway Options Study

Corporation at Block 142, Lot 227) has also moved. In Woodside, a new office building is being built on what in 1975 was a vacant parcel (Block 1294, Lot 20). That building at 62-07 Woodside Avenue is to be completed by June 1984 and will contain 11,548 square feet of office space. Called the Roosevelt Maintenance Company building, the structure will contain 46 workers, using a standard of 250 square feet of office space per employee. A portion of the lot is to be acquired, according to the 1975 report, but using a worst case analysis, it is assumed that all 46 workers would be displaced. The 1975 report only counts one business displaced on Block 1294, Lot 46 on Roosevelt Avenue in Woodside. Actually that lot which is to be completely taken contains ten other businesses, most of them small shops but also including the large Woodside Steak House.

The changes since 1975 result in a figure of 29 businesses potentially displaced, employing a total of approximately 224. The major employers displaced besides those already mentioned are the Handy Tool and Manufacturing Co. at 3909 58th Street, Famous Overseas at 4501 Barnett Avenue and J.B. Energy Environmental at 3817 Woodside Avenue. The displaced businesses along Northern Boulevard are Astoria Lumber, Galaxy Restaurant and A-1 Instant Copy. The businesses on Barnett Avenue are R&R Vending Corp., Barnett Auto Repair, Associated Fisheries, Inc., N. Berkowitz Iron Works and Complete Auto Repair. At 57-18 39th Street is Theatre Confections, another potentially displaced business. In addition, retail businesses on Yellowstone Boulevard will be impacted by the extended period of construction along that route. Those businesses include a Waldbaum's grocery store, BJS Drugs and a Bank Leumi.

Secondary Development. Improved transportation service, resulting from this alternative may have the long term effect of improving the borough's business climate, however as with the previously discussed alternatives, substantial new development activity is unlikely to result. The new Northern Boulevard Station could become a focus for redevelopment in Long Island City, particulary if a developer were to utilize the group of properties acquired by MTA for the transit improvements. Offices would be the most likely use in this location. However, the market for new office space in this area is untested and prospects, even with the transit improvements, are uncertain given market conditions. While the area's industries would undoubtedly benefit from improved transit services, the existing healthy industrial market will not be stimulated in a major way. Substantial new development around the two new stations at Woodside and 71st-Continental Avenues is not likely given the already developed nature of those areas. In Jamaica, improved transit services will support existing business development efforts but will not lead directly to new development activity.

Impact on Freight Operations. This alternative will not notably impact existing freight operations although construction will displace a public siding east of 70th Street, used by the Supro Building Products Corporation in conjunction with truck freight. That firm utilizes the siding as an alternative for flexibility in scheduling shipments if one transport mode is disrupted.

5.1.3 Queens Boulevard Line - Local Connection

5.1.3(a) Land Use and Secondary Development Impacts

Land use impacts of this alternative are limited to two parking lots in Long Island City and several properties along Northern Boulevard that the MTA would acquire to accommodate construction of the alternative. The first is the Kinney System parking lot at 29-69 Northern Boulevard, under which the 63rd Street tunnel will be extended to link up with the Queens Boulevard line. That parking lot has a capacity for 448 cars and is used mainly by commuters. The second is the parking lot at 25-01 Jackson Avenue, located across from the New York State Supreme Court, under which an underground pedestrian passageway will be constructed to provide a link from the Court Square Station on the GG line with the 23rd Street -- Ely Avenue Station on the Queens Boulevard line. Land use changes in both locations will be temporary and once construction is complete, all improvements will be underground. The parking lot on Northern Boulevard may either be restored for parking by the MTA or sold to a private developer. In the later case permanent land use changes could result. The properties to be acquired by the MTA along Northern Boulevard include a parking lot, a diner, a used car lot, a one story auto service facility and a six story industrial structure. These were assumed to be demolished and eventually redeveloped for other uses, although they may be underpinned and retained.

Similar to the first alternative discussed above, this alternative is not likely to induce substantial growth and development. However, improved access to Jamaica will support revitalization efforts there. In Long Island City, which is an established industrial district, office-related uses can be expected to increase modestly with or without the new subway service provided under this option. However, without a new station as a focus for the alternative, a potential impetus to new development will be lost.

5.1.3(b) Community Impacts

Residential Displacement. This alternative will require no residential displacement.

Community Cohesiveness. Although improved transportation linkages will improve travel service between communities within Queens, the alternative will have little effect on cohesiveness within the communities.

Safety and Security. The major security issue associated with this alternative is the passageway at Court Square which has been identified by community members as potentially unsafe. The passageway will be designed with lighting and other security features such as possible remote surveillance to provide a safe and pleasant facility for transit users and the straight alignment will provide the shortest and most secure route for passengers moving between the two stations. Modifications of the two mezzanines, including relocated token booths allowing visual observation of the passageway, and modified and additional platform stairways, will increase the safety and attractiveness of this transfer to the public.

Transportation Services. This alternative will improve transportation service by relieving overcrowding on the E and F line. The magnitude of this improvement and the extent to which the new line will divert riders from the E and F lines are described in the Transportation Section. More direct service to Manhattan will also be provided to residents in Community Districts 3 and 4.

The alternative will also require the termination of existing GG service between Brooklyn and Queens at the Court Square Station. In its place, a transfer will be provided from the GG train at Court Square to the E and F lines at 23rd Street-Ely Avenue through the passageway described above. The transfer will be free, but there will probably be some temporary inconvenience while travellers adjust to the change. During construction of the Local Connection alternative, there will also be some disruption of transit service. Speed restrictions would be required on the Queens Boulevard line for nine months, and the RR line would have to close for two to four weekends. It would also require late night re-routings of the Queens Boulevard local to the express tracks for one and a half years and 24-hour re-routing of the Queens Boulevard local to the express tracks for two to three weeks.

Visual Quality. No permanent visual quality changes will result from this alternative since permanent physical changes will be underground. Station entrances will be visible at the street level.

Community Facilities. Community facilities in the area would not be affected by this alternative. Long Island City High School (Facility 1 in Table 3-8) and St. Patricks School (Facility 1 in Table 3-9) would be separated by 29th Street from construction activity in the Kinney System parking lot.

Construction. Construction activity in Long Island City required under this alternative will cause some disruption on local streets. (See Arterials and Local Streets section of Chapter 4.) During an approximate two year period, the sidewalk on the south side of Northern Boulevard from 40th Road to a point just east of Honeywell Street would be closed for pedestrian and driveway access. Access to businesses would however be provided by a temporary deck. During the construction period, there would be noise, dust, and visual quality and traffic impacts normally associated with heavy construction activity at the two sites. The elimination of the two parking facilities during construction would also inconvenience commuters who comprise the vast majority of people who currently use those facilities, and to a lesser extent at the Court Square lot, the people who work at or visit the court and park there.

5.1.3(c) Economic Impacts

Construction. Construction of the proposed improvements will cost an estimated $85.8 million (1983 dollars).

Based on typical wage and fringe benefit rates for construction labor within New York City, direct employment resulting from construction expenditures is an estimated 710 person-years (the equivalent of one employee working one year) for the entire construction period. This estimate assumes construction begins in January 1989 and is completed by January 1993.

In addition to direct employment, employment resulting from construction expenditures includes indirect or generated employment, that is jobs in business establishments providing goods and services to contractors. Based on economic multipliers for principal sectors of the New York City and New York State economies developed by the New York State Office of Planning Coordination and based on experience on comparable major development projects, total direct and generated employment resulting from the construction expenditures are estimated to total approximately 1,470 person-years of employment within New York State. Of this 1,200 person-years of employment would be within New York City.

The construction activity will also generate substantial tax revenues for both the state and city. Taking into account indirect expenditures, total economic activity resulting from construction activity is estimated at $107.8 million in New York State, $80.7 million of which would be spent within New York City. While direct expenditures by the MTA are not taxed, based on aggregated data on economic activity and tax receipts for the New York State and New York City economies developed by the New York City Office of Management and Budget for use in evaluating other development projects, it is estimated that tax revenues from construction activity will equal approximately 4.2 percent of the projects total economic activity in New York State. Of these tax revenues, the largest portion will come from personal income taxes and from sales and corporate taxes on direct and induced economic activity. New York State will receive approximately $3.3 million and New York City will receive approximately $1.2 million of the tax revenues generated by construction. In total, construction of the project is estimated to generate approximately $4.5 million in tax revenues for New York City and New York State.

Other Capital Expenditures. Expenditures for rolling stock required under the alternative are approximately $136.2 million (1983 dollars). This is exclusive of expenditures on rolling stock related to No Additional Construction.

Operations and Maintenance. Total operating costs for the alternative are estimated at $21.74 million (1983). The new services will require additional Transit Authority employees. A total of 443 permanent jobs will be created (see Chapter 2 for details). Based on typical economic multipliers for sectors of the New York City and New York State economies developed from similar expenditures (New York State Office of Planning Coordination), these operations and maintenance expenditures would generate approximately 180 additional jobs in New York City and State for a total of approximately 620 new permanent jobs. Tax revenues generated by the direct and indirect activity will be approximately $1.7 million per year. The largest expected category will be personal income taxes on wages and salaries.

Business Displacement and Disruption. Construction of a connecting link between the 63rd Street Tunnel and the local tracks of the Queens Boulevard line will cause some displacement/disruption of local businesses. (Refer to Figure 5-2.) Figure A.9-2, found in the Appendix, depicts the area along Northern Boulevard where most properties to be acquired are located, and the property numbers referred to here are found on that figure.

Subsurface easements will be necessary under five properties (properties 49, 57, 103 and 111). These will not cause major disruption. Five other properties will be acquired either in whole or in part. These are the Kinney System parking lot at 29-69 Northern Boulevard, property 60 -- a six-story fully-occupied industrial building, 98 -- a one-story building occupied by Tilden Brakes, 105 -- a one-story building and a Hertz used car lot soon to be closed, and 109 -- a one- story diner. Another parking lot (property 1 on Figure A.9-3) will be disrupted by construction of the pedestrian connection at Court Square. This lot is owned by Leckas Enterprises, Inc. and is located at 25-01 Jackson Avenue. A total of 378 jobs in ten firms could potentially be displaced by this alternative. Ninety-five percent of those jobs are located in firms in property 60 -- the six-story industrial building on Northern Boulevard. The engineering information developed to date says that there is a possibility that a portion of property 60 will have to be acquired. For this analysis, a worst case in which all firms are displaced is assumed. The major firms in that building include A.J. Wildman & Son, Tex Style Creaters, Applebaum Tag & Label, Co. and Direct Press.

Construction activity will have temporary effects on some businesses in the area. During construction, the sidewalk on the south side of Northern Boulevard from 40th Road to just west of Honeywell Street would be closed to pedestrian and driveway access. Many businesses fronting the southeast of Northern Boulevard require driveway access to their properties. Access could be provided via a temporary deck-over. Pedestrian access with the deck-over would be difficult. The eastbound curb lane on Northern Boulevard would be temporarily closed to vehicles while sheeting is driven through the street over the tracks. This activity would be restricted to off peak hours during which time access to the local businesses would be obstructed.

Secondary Development. Although transportation service in Queens will be improved under this alternative, substantial new development activity is not likely to result. Rather improved service is one of many factors -- including favorable market conditions and available development sites, which together may ultimately stimulate new development activity.

The Long Island City area which is already well served by numerous mass transit lines, is an established industrial district where few soft sites for redevelopment currently exist. In order to facilitate construc tion of this alternative the MTA would acquire several properties in this area. These sites, which include the large Kinney parking lot, are all in close proximity to each other on Northern Boulevard and could provide opportunities for redevelopment after construction is completed. However, without a new station to serve as a focus for new development in this location, market conditions in the area do not appear to be strong enough to stimulate major commercial development. No impacts in other areas of Queens are expected. Since significant secondary development is not anticipated, no secondary impacts on services or the tax base are expected.

Impact on Freight Operation. No impact on existing freight operation will result from this alternative.

5.1.4 Subway/LIRR-Montauk Transfer

5.1.4(a) Land Use and Secondary Development

Implementation of this alternative would generate greater land use changes than would any of the previously discussed alternatives.

Implementation of the alternative would require construction of a transfer station at the Sunnyside Yards in Long Island City, where passengers would transfer between Transit Authority trains operating in the 63rd Street Tunnel and Long Island Railroad trains running on the Montauk alignment. The two-level station would be constructed in an open-cut with TA facilities below an at-grade LIRR station. (See Figure A.9-4). Four lightly used stops -- Haberman, Penny Bridge, Fresh Pond and Glendale -- on the LIRR/Montauk passenger line would be eliminated. Six existing stations at Richmond Hill, Hollis, Queens Village, Locust Manor, Laurelton and Rosedale would be renovated and expanded.

With electrification and a substantial increase in the frequency of trains on the Montauk Branch, a number of existing grade crossings will be eliminated and replaced with bridges over the right-of-way, altering land use in some locations. (See discussion of business and employment displacement and disruption for more complete details on the crossings.) A total of four transformer substations would be constructed on vacant land along the alignment.

The seven new or upgraded stations included in the alternative will have limited stimulative effects on the areas in which they are located. While the location of the transfer station in the Sunnyside Yards will make the Long Island City area more accessible to residents of both New York City and Long Island, the location is somewhat removed from the prime commercial areas in Long Island City and will not create substantial opportunities for new development. The area around the expanded Richmond Hill station is already fully developed with local retail and service uses, including those which serve the existing commuter population, leaving limited opportunities for further development. The new transit service and improved stations in Southeast Queens may make those areas more attractive as residential locations. Limited transit service to Southeast Queens has contributed to the abundance of much vacant and residentially zoned property, creating opportunities for infill development. Additional commercial development around the new stations will be limited as patronage projections are not great enough to indicate substantial demand for new commercial use.

Development in downtown Jamaica may be boosted by more direct access to midtown Manhattan. As with the other alternatives, new transit service will support ongoing development activities but alone will not stimulate new development.

5.1.4(b) Community Impacts

From a community point of view, upgrading of the Montauk alignment from an infrequently used passenger and freight line to active use for passenger trains will not have significant system-wide impacts, but will have some local impacts on the communities through which it passes.

Residential Displacement. At least one residential unit could be displaced by this alternative. (Refer to Figure 5-1.) At the 88th Street crossing (see Figure A.9-14), the dwelling unit on the second floor of the building at 75-01 88th Street above the Heros Plus Restaurant could potentially be displaced. The residential property (87-12 77th Avenue) on 88th Street at the corner of 77th Avenue (Lot 153 on Figure A.9-14) would be affected because access to it will be restricted. At the 73rd Street grade crossing elimination, a residential property (Block 3667, Lot 447) which also has a commercial use (florist) would be affected by a new access road which would be within five feet of the building.

Community Cohesiveness. The existing alignment, which predates much of the development alongside it, passes through well developed communities and its right of way is adjacent to homes, schools, other institutions, commercial and industrial areas. The line which is now used by diesel trains is not electrified and is generally viewed by the surrounding communities as not dangerous and not intrusive. The lack of transit services in the areas along the Montauk Line is viewed by some elements within the communities, particularly in Glendale, Maspeth, Middle Village (in Community Board 5) and Richmond Hill (in Board 9), as providing a degree of isolation from New York City's social and crime problems. By greatly increasing service and the number of trains and providing various security and noise abatement features, the improvements are viewed by many vocal community residents as creating physical barriers and opening up these relatively homogenous communities to outside influences. In reality the creation of a barrier must be seen as merely a temporary impact, experienced only until residents adjust to the use of under and overpasses. The possibility of opening the community to objectionable outside influences is small, given the few stops within these communities proposed for the alternative.

Another impact of the improvements related to community quality of life is increased or more intrusive noise levels which are discussed quantitatively in the noise section of this chapter. There is a generalized fear, particularly in the communities of Glendale and Middle Village that these noise impacts will change the ambience of the communities and result in a corresponding loss in property value. The relationship between these impacts and property values are unpredictable. However, the quality of life in these surrounding communities would be adversely affected, without substantially improved transit services.

Security. The existing alignment is fenced in most places with chain link and barbed wire, but all along its length fences have been broken to allow residents, including school children traveling to school, and workers to cross the line at convenient spots. Figure 5-3 shows where some of the major such crossings of the Montauk Line are located in Glendale and Middle Village. Children frequently play among the tracks. With the proposed improvements, the line will be electrified and the number of trains using the alignment will substantially increase. The alignment will be completely secured and crossing will become more difficult.

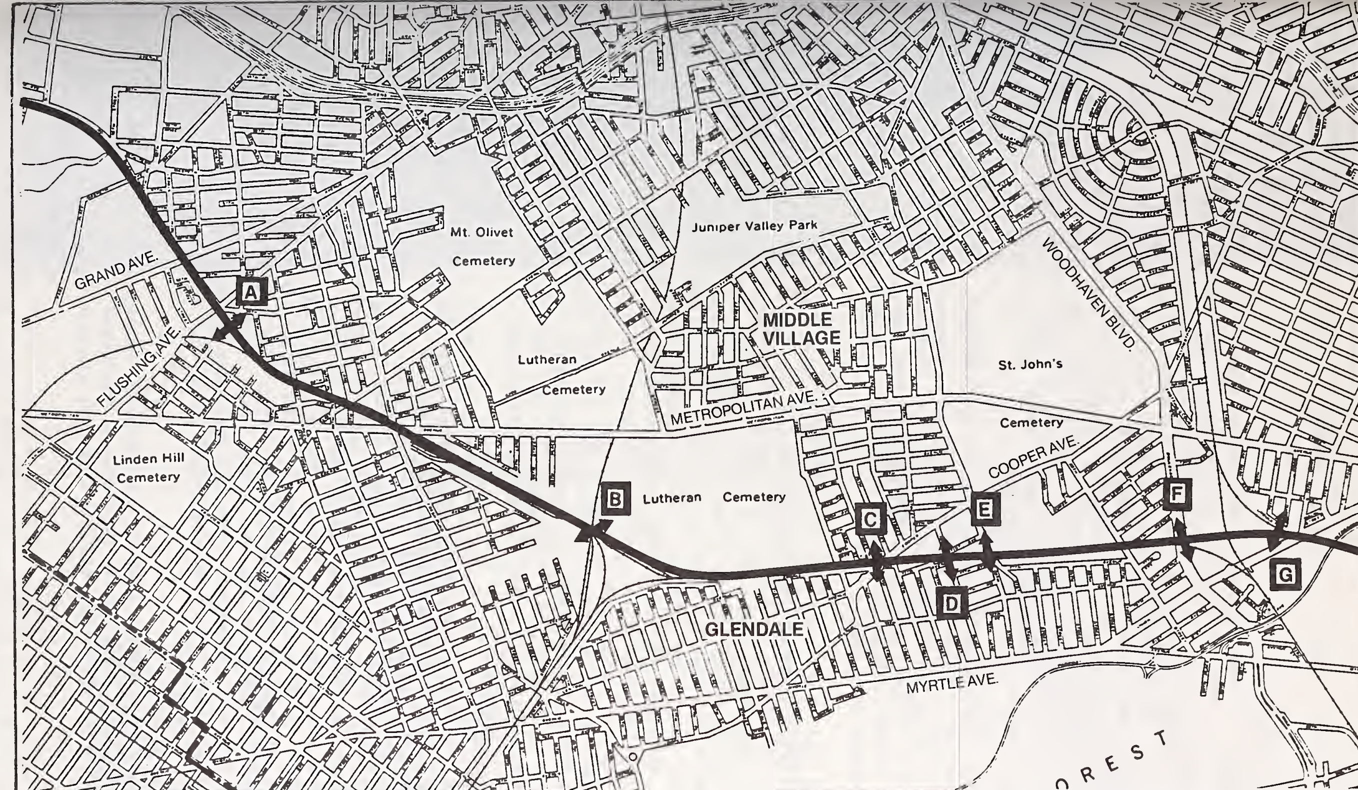
If either Montauk Line option is chosen as the preferred alternative, consideration will be given to construction of pedestrian overpasses at certain of the existing informal crossing locations. This consideration also includes the proposed grade crossing elimination at 73rd Street in Glendale (see Figure 2-14 Existing Grade Crossings of Montauk Line to be Eliminated or Modified).

The change could have several ramifications for the local communities. First, by creating a real physical barrier to crossing the tracks or using the tracks as play areas, safety conditions in the community will improve over existing conditions. School children, particularly those who attend JHS 119 and Sacred Heart and other residents who habitually cross the tracks where fences have been broken will be required to use the existing under and overpasses and new ones that will be provided. Second, safety and security for the traveling public will be vastly improved over existing transit facilities. New and expanded stations will be well lit, with clear signage, wide platforms and will be designed to eliminate dark corners or hazardous passageways and provided with state-of-the-art mechanical security systems as well as standard Transit Authority patrols. Of particular concern to community groups has been the passageway between the Thomson Avenue transfer station and the Queens Plaza Station. Design of this passageway will be attended to with particular care. Other benefits of the system will include increased comfort and reliability for the traveler.

<u>Transportation Service</u>. This alternative provides the greatest increase in geographic coverage of all the alternatives -- expanding access to over 140,000 persons who do not have convenient access (as measured by a walking distance of up to 0.8 miles) under existing conditions. Transportation service in previously underserved areas, principally in Southeast Queens and in the vicinity of Richmond Hill will be substantially improved. However, there will be less relief provided to existing overcrowding on the Queens Boulevard line than under the other "build" alternatives.

In addition to affecting the Queens Boulevard and Astoria lines during construction (as described under the Local Connection alternative),this alternative would also cause delays for off-peak and weekend trains at the Long Island Rail Road Jamaica Station for one year -- affecting the Main Line and Montauk and Atlantic Branches. Construction of this alternative would require the closing of the Flushing line for two to four weekends.

The construction of the bridges over several existing grade crossings will temporarily affect travel time at several locations but will have no long term impacts on traffic.



Legend

- A Flushing Avenue — Underpass exists but it is not used
- B Mafera Park — Path between Christ the King H.S. and Park
- C Cooper Avenue — Underpass exists, but it is not used
- D 76th Street and Edsall Avenue
- E 79th Street
- F Woodhaven Boulevard — Path under the existing overpass
- G Union Turnpike
- ▬ Montauk Line

0 2000
Scale in Feet

N

INFORMAL PEDESTRIAN CROSSINGS OF THE MONTAUK LINE IN MIDDLE VILLAGE AND GLENDALE

Figure 5-3

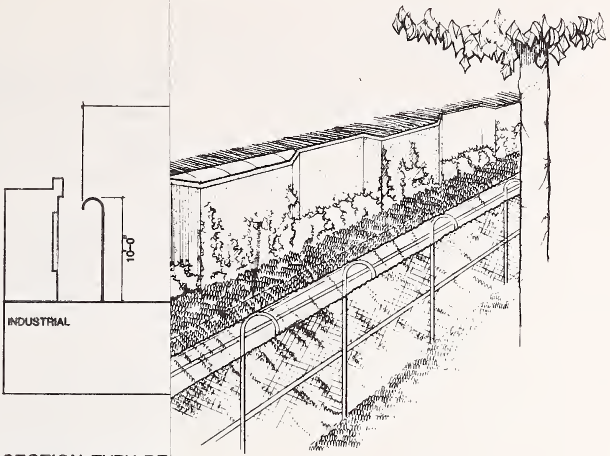
Visual Quality. Visual quality along the alignment will change substantially. Trackbeds and tracks will be reconstructed and places where debris collects or which are used for dumping will be cleaned up. Overall, the change will improve existing conditions. New fences, shown in Figure 5-4 will be higher, more formidable and more visually intrusive. In some areas where concrete noise and security barriers will be erected along the alignment, views will be blocked. The frequency of trains will also substantially change visual quality along the alignment. The construction of four power substations along the alignment would have a minor impact on visual conditions (Figures 2-11 through 2-13 in Chapter 2 show substation locations and provide conceptual drawings of the substations).

Visual quality changes will also occur in station areas. For the most part, improvements will involve renovations and expansions of existing stations in built-up areas. The Thomson Avenue Transfer Station in the Sunnyside Yards will be constructed in a deep open cut and will not be highly visible from the street. Outside of the right-of-way and station areas, no visual quality changes will occur.

Finally, the new overpasses and bridges will have some visual quality impacts. The elevated roadway structure proposed for the Greenpoint Avenue grade separation will impair views of the Newton Creek Waterway. The impact of the Laurel Hill Boulevard -43rd Street grade separation structure is somewhat reduced by the proximity of the Brooklyn Queens Expressway viaduct overhead and the shadow created by that structure. The Maspeth Avenue grade separation imposes about 200 feet of ramped elevated roadway north of the railroad in the vicinity of the mixed residential-commercial block along Maspeth Avenue, between 57th Place and 58th Street. The 88th Street grade separation will have a major visual impact on the area, particularly on properties adjacent to the elevated structure. At the Woodhaven Boulevard Station, the expansion of the elevated viaduct structure and addition of an elevated fare control area on the east side of the bus drop-off lane will result in only modest change in existing visual conditions.

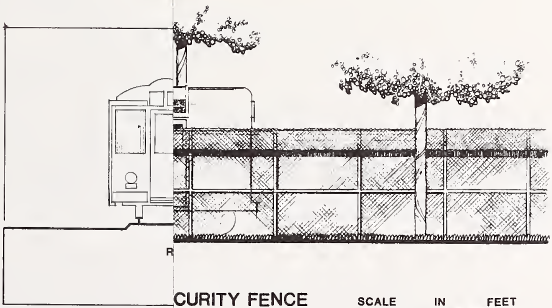
Community Facilities. With the exception of more intrusive noise impacts for Christ the King High School, no significant impacts to public or private schools are likely to occur from implementation of this alternative. Public schools along the alignment are listed in Table 3-8. With the exception of P.S. 30 and Springfield Gardens High School, all public schools are one to two blocks away from the alignment. P.S. 30 (Facility 30 in Table 3-8) is separated from the alignment by Bedell Street, and Springfield Gardens High School (Facility 16 in Table 3-8) is separated from the alignment by its athletic field which is adjacent to the line. Implementation of the alternative will involve construction of completely secure fences and noise barriers between the line and the field. All non-public schools are one to two blocks from the alignment, with the exception of Holy Cross School (Facility 5 in Table 3-9) which is separated from the alignment by Rust Street.

Construction Impacts. Some construction related impacts on land use and community resources will result from congestion, increased noise, dust and other bothersome effects along the alignment and in station areas during the



SECTION THRU RES

SOUND BARRIER WITH SECURITY FENCE

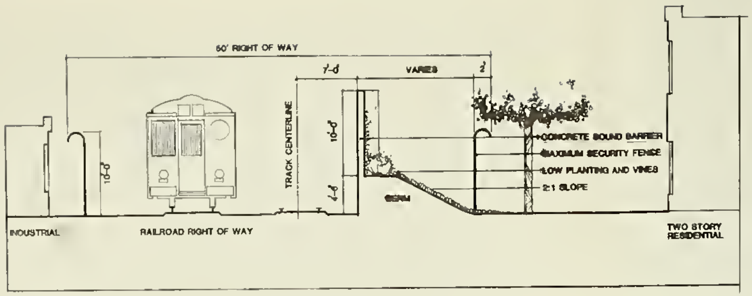


CURITY FENCE

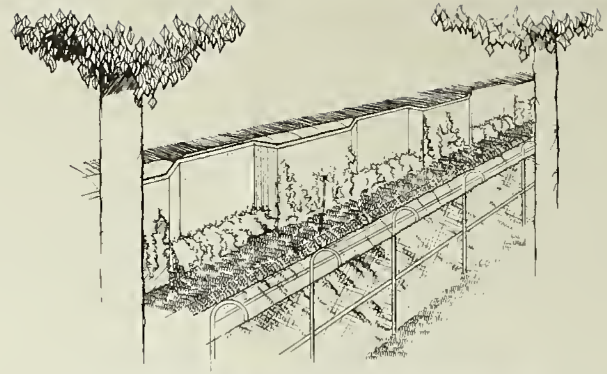
SCALE IN FEET

8' 4' 0' 8'

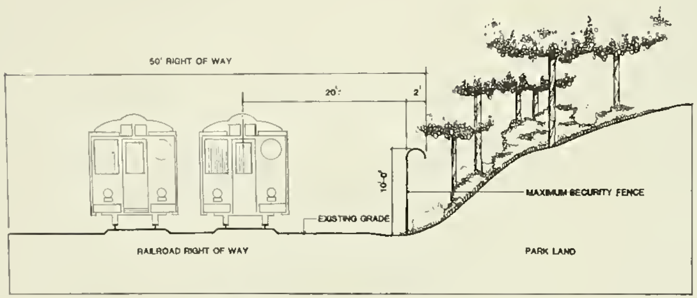
SECURITY FENCE AND SOUND BARRIER SECTIONS AND ELEVATIONS Figure 5-4



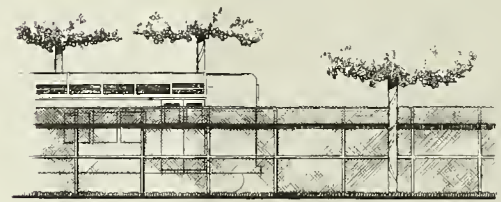
SECTION THRU RESIDENTIAL AND INDUSTRIAL AREA



VIEW ALONG CONCRETE SOUND BARRIER WITH SECURITY FENCE



SECTION THRU WOODED AREA



TYPICAL VIEW ALONG SECURITY FENCE

SCALE IN FEET
8' 4' 0' 8'

SECURITY FENCE AND SOUND BARRIER SECTIONS AND ELEVATIONS Figure 5-4

construction period. These impacts will be periodic and temporary and will be limited to isolated locations at any point in time. Since they can be minimized or eliminated through careful control of construction procedures, these impacts will not be significant. Reconstruction of the track will be restricted to areas within the existing right of way. The work will be completed in sections and access to existing development will be maintained.

Construction of transit stations will involve some demolition, some site clearance, site preparation, some building construction, installation of transit system equipment and landscaping. Impacts of these activities will be temporary and limited to the immediate vicinity of the stations. Potentially disruptive activities will be strictly controlled.

Construction of the various bridges required to eliminate existing grade crossings will have some impacts mostly related to traffic. Construction of the Maspeth Avenue grade separation will require some diversion to Grand Avenue causing increased travel time, although adequate capacity does exist to accommodate the diversions. The construction of the Woodhaven Boulevard Station will require a lane reduction on Woodhaven Boulevard. The lane loss will be limited to off-peak hours when traffic volumes can be accommodated by fewer lanes. Construction of the Laurel Hill Boulevard-43rd Street grade separation will minimally impact traffic as both existing crossings would remain open until construction is completed.

Construction activity would also affect transit and freight service as described in the transportation services and freight operations sections for this alternative.

5.1.4(c) Economic Impacts

Construction. Construction of the proposed improvements including modification to Yard A and the Queens Village Team Track Yard will cost an estimated $291.0 million (1983 dollars).

Based on typical wage and fringe benefit rates for construction labor within New York City, direct employment related to construction expenditures is estimated at 2,550 person years (the equivalent of one employee working one year) for the entire construction period which will begin in late 1989 and be completed by January 1995.

In addition to direct employment, total employment resulting from the construction expenditures would include jobs in business establishments providing goods and services to the contractors, and other resulting indirect or generated employment. Based on economic multipliers for principal sectors and the New York City and New York State economies developed by the New York State Office of Planning Coordination and on experience of comparable major development projects, total direct and generated jobs resulting from construction expenditures are estimated at a total of about 4,970 person-year of employment within New York State, of which 4,100 person years of employment are within New York City.

Construction activity will also generate substantial tax revenues for New York State and City. Taking into account indirect expenditures, total economic activity resulting from the construction activity is estimated at $363.7 million in New York State; $273.6 million of which would be spent within New York City.

While direct expenditures by the MTA are not taxed, based on aggregate data on economic activity and tax receipts for the New York State and New York City economies developed by the New York City Office of Management and Budget for use in evaluating other development projects, it is estimated that tax revenues from construction activities will equal approximately 4.2 percent of the projects total economic activity in New York State. Of these tax revenues, the largest portion derives from personal income taxes and from sales and corporate taxes on direct and induced economic activity. New York State will receive approximately $11.0 million (72 percent) and New York City will receive approximately $4.3 million (28 percent) of the tax revenues generated by construction. In total, construction of the project is estimated to generate approximately 15.3 million in tax revenues for New York City and New York State.

Other Capital Expenditures. Capital expenditures for rolling stock required under this alternative are approximately $197 million (1983 dollars, exclusive of expenditures for rolling stock needed for operation of the improvements now under construction).

Operations. Total operating cost for the alternative are estimated at $46.98 million (1983) and will require the addition of an estimated 965 new Transit Authority and Long Island Rail Road employees (see Chapter 2 for details). Based on typical economic multipliers for sectors of the New York City and New York State economies developed from similar expenditures (New York State Office of Planning Coordination), these operations and maintenance expenditures would generate approximately an additional 325 jobs in New York City and State, for a total of approximately 1,350 new permanent jobs.

Tax revenues generated by the direct and indirect activity will be approximately $3.6 million per year. The largest expected increase will be personal income taxes on wages and salaries.

Business Displacement and Disruption. This alternative will result in the displacement or disruption of business activity and jobs, primarily as a result of construction of the bridges needed to replace existing grade crossings. (Refer to Figure 5-2.) It is possible that 81 jobs in three firms could be displaced.

Construction of the Greenpoint Avenue grade separation will affect the firms on Lot 39 on Figure A.9-10. The firm closest to the bridge is C.F.S. Inc., and it is assumed that it will be displaced. The property owned by Galleia Brothers, Inc. -- a petroleum distributor and involving Getty and Barrow Oil (Lot 2 on Figure A.9-10) will also be affected. Impacts on Galleia Brothers include possible disruption of oil distribution operations through restriction, but not elimination, of water access and by partial removal of existing storage tanks.

The Laurel Hill Boulevard-43rd Street grade separation will require the purchase of one vacant property owned by the New York City Department of Public Works (Lot 52 on Figure A.9-12) and a portion of an unimproved open lot owned by Phelps Dodge (Lot 1 on Figure A.9-12). The Phelps Dodge lot, previously used for baling scrap materials, is not now utilized, due to termination of the company's operations and is for sale.

The Maspeth Avenue grade separation will affect the Clindon Diner located in the triangle formed by Maspeth Avenue, Rust and 57th Streets. Another business, Duna Complete Auto Repairs (Lot 15 in Figure A.9-13) will also be affected. Direct access to these properties from Maspeth Avenue will be permanently eliminated. Despite partial acquisition of their properties, operations of the diner and the service station are not likely to be permanently altered.

The 88th Street grade separation will require the complete acquisition of two properties and the partial acquisition of seven others. In addition, access to four properties would be restricted. The properties to be acquired are Block 3956, Lot 159 and Block 3956, Lot 156 (see Figure A.9-14). The first property contains a restaurant called Heros Plus and another small commercial building which in early 1984 was unoccupied. The second property contains the Cosmetic Components Corporation at 88-05 76th Avenue. All the jobs on those properties would be displaced. Major disruption of operations and possible displacement of a crane repair firm called Jo-R Pile Lead and Boom Corp. on Lot 161 could occur (see Figure A.9-14). Some inconvenience, due to elimination of some parking areas or permanent change in access will occur on Lot 257 (Heidelberg Eastern Inc.), Lots 111 and 113 (George Kovacs Lighting), Lot 154 (Coca Cola), Lots 60 and 114 (Caroline Machine and Tool).

At the 73rd Street grade crossing elimination, the construction of a new access road from 73rd Place to the Lutheran Cemetery will require some partial property takings. A portion of a loading dock at Steiger Brothers Express Co. Inc. (68-80 73rd Place) will be removed. A portion of the property which contains a florist business (Owen Florists -- Block 3667, Lot 447) will also be removed.

Though access for workers at Sunnyside Yards would be altered, no significant impact on businesses or existing employment in that area will result. As proposed, vehicular access to the rail yards for yard workers will be shifted from Queens Street to Dutch Kills. Queens Street will provide pedestrian access to the new station. Due to the narrow street width (two moving lanes) and the need for a tunnel turn-around, vehicles should be discouraged from entering Queens Street.

<u>Secondary Development</u>. Improved transportation service may improve access for people in Southeast Queens to employment opportunities.

Substantial new job-generating commercial development will not directly result from this alternative although access to Long Island City will be improved for some Queens residents and for commuters from Nassau and Suffolk counties, benefiting existing industries. Location of the station in the Sunnyside Yards, surrounded by industrial uses combined with existing market conditions (described elsewhere) make substantial spin-off commercial development unlikely. In Jamaica, improved access to Manhattan will contribute to ongoing improvements in the business climate but would not be sufficient to directly stimulate new development activity.

Significant development around the other new or expanded stations is not likely. The area around the Richmond Hill Station is already well developed with commercial and service uses and cannot support significant new development. Low residential density around stations in Southeast Queens and strong competition from Nassau County will preclude substantial commercial activity around these stations. Small convenience-type retail development around the expanded stations is possible. However, based on patronage projections, even this type of development is not very likely.

Impacts on Freight Operations. The Montauk Branch of the Long Island Railroad is an important route for movement of freight from the Main Line to Brooklyn, Queens, Nassau and Suffolk Counties. The route serves as the railroad's through route for freight and the portion between Fresh Pond Road and Long Island City is surrounded by industries that receive rail freight deliveries on private sidings or public team tracks. Even in times of declining usage, the freight service is critical as a backup in the event of a truck strike, gasoline price increase or other situations which could dramatically increase usage on a temporary basis.

The operation of the Montauk Transfer alternative will not significantly affect existing freight operations. All freight operating times will be identical to current schedules, with the exception of the Fresh Pond local which will operate two hours later in the Montauk Transfer alternative. All Montauk Branch customers will continue to receive carload deliveries at their preferred times. Construction of the alternative would, however, create delays for freight trains on the Montauk Branch for up to two years.

5.1.5 Montauk/Archer Avenue Subway

5.1.5(a) Land Use and Secondary Development Impacts

Implementation of this alternative will generate land use changes similar to those associated with the Montauk Transfer alternative with several exceptions. In the Sunnyside Yards a station similar to that proposed in the Montauk Transfer alternative will be constructed, however LIRR Station over the Transit Authority station will not be required. A transfer will be provided to the IND Queens Plaza Station. Other notable land use changes will result from the construction of new stations at Fresh Pond Road and Woodhaven Boulevard. The existing Richmond Hill Station will be refurbished as part of this alternative. Finally, three existing LIRR stations -- Penny Bridge, Haberman and Glendale -- will be eliminated.

More significant land use changes will occur in Richmond Hill where the new Transit Authority line on the Montauk Branch will connect with the Archer Avenue subway which is now nearing completion. These improvements will require displacement of several commercial uses on the northeast corner of Jamaica Avenue and Lefferts Boulevard. The work will enable the City to demolish the existing Jamaica Elevated from Crescent Street near the Brooklyn border to Lefferts Boulevard.

The potential for secondary development impacts resulting from this alternative is somewhat greater than that of the Montauk Transfer alternative.

Improved access to Manhattan could increase activity in the residential market in Ridgewood, Glendale and Middle Village. The composition of the housing stock in Ridgewood, particularly the availability of brownstones and other rowhouses, the staple of New York City's gentrifying neighborhoods, the neighborhood's recent designation as an historic district, and the apparent receptivity of the community to new residents, suggest that an influx of new residents is more likely here than in other nearby neighborhoods which do not seem receptive to change or new residents.

Large scale development is unlikely given existing zoning and limited availability of development sites. New development is likely to be limited to some scattered infill development at the same densities that now exist.

The prospects for substantial new commercial development in Long Island City and around the Richmond Hill, Fresh Pond and Woodhaven Boulevard Stations will not be substantial (See Employment Section for more details). In Jamaica, the more direct access provided under this alternative could give a more significant boost to proposed development activities.

5.1.5(b) Community Impacts

Upgrading of the Montauk alignment from an infrequently used passenger and freight line to active use for passenger trains will have local impacts on the communities through which it passes which are similar to those of the Montauk Transfer alternative. Impacts which will vary are described below:

Residential Displacement. The impacts of this alternative are the same as those under the Montauk Transfer scheme.

Community Cohesiveness. Because this alternative will improve the accessibility of some communities to outsiders, perceived impacts on community cohesiveness by local residents are greater than those of the Montauk Transfer alternative. In Richmond Hill and Woodhaven the demolition of the Jamaica Avenue Elevated could improve community cohesiveness.

Security. Impacts on safety and security conditions will be similar to those described under the Montauk Transfer alternative except that the number of trains running on the line will be greater under this alternative.

As with the Montauk Transfer alternative increased safety and security facilities will be required.

Transportation Services. Of all the alternatives, Montauk/Archer provides the greatest aggregate time savings over baseline conditions and provides the greatest increase in geographic coverage (although substantially less than Montauk Transfer). Transportation service to presently underserved areas will be improved, particularly in Community Districts 5 and 9. Of all alternatives being considered, the Montauk/Archer alternative provides the greatest improvements in service to Jamaica, since the alternative best utilizes the new Archer Avenue subway. With demolition of additional sections of the Jamaica Avenue Elevated, the J train will be terminated at Crescent Avenue with some inconvenience to J train travelers in Woodhaven and possibly Richmond Hill. However, additional bus service will be provided to the new Richmond Hill Station, where superior service to that currently available on the J train will be provided. Construction activity and demolition of the Elevated would require closing of the lower level of the Archer Avenue line, providing additional inconvenience and alternative service for an 18 to 24 month period.

The provision of a bus drop-off lane on the Woodhaven Boulevard Viaduct to serve the new Woodhaven Boulevard Station could create a serious potential impact to through traffic on Woodhaven Boulevard.

Visual Quality. Overall, the change will improve existing conditions. As in the Montauk Transfer alternative, the security fence and sound barrier shown in Figure 5-4 will be higher, more formidable and more visually intrusive. Differences between this and the Montauk Transfer alternative involve the demolition of a 3½ mile section of the Jamaica Avenue Elevated in Richmond Hill and Woodhaven. Removal of the Elevated, a structure which by its very mass has had overpowering visual impact on the community, will significantly improve existing visual quality. Six transformer stations would be constructed along the alignment. They would provide additional, but not significant, visual impacts (see Figures 2-11 through 2-13 in Chapter 2 for the locations and conceptual drawings of the substations).

Community Facilities. The discussion on community facilities under the Montauk Transfer alternative applies to the Montauk/Archer scheme, except that fewer schools are involved since the alignment does not extend to southeast Queens.

Construction Impacts. With the exception of impacts of removal of the Elevated, impacts will be similar to those described under the Montauk Transfer alternative. Removal of the Elevated will occur in sections in two stages. The first stage involves the removal of cables, track, signals, signs, etc. from the structure and will involve relatively little impact. There will be no change in traffic patterns or increases in noise, dust and dirt. The second stage, which will extend for approximately two weeks per block, involves removal of the structure itself and will involve noise, dust, dirt and traffic disruption associated with dismantling the structure. Appropriate precautions will be taken to assure community safety and mitigation measures taken to reduce impacts.

5.1.5(c) Economic Impacts

Construction. Construction of the proposed improvements including modifications to Yard A and the Fresh Pond freight yard will cost an estimated $381.4 million (1983 dollars).

Based on typical wage and fringe benefit rates for construction labor within New York City, direct employment from construction expenditures is estimated at 3,270 person-years (the equivalent of one employee working one year) for the entire construction period which will begin in 1991 and be completed by January 1997.

In addition to direct employment, total employment resulting from construction expenditures includes jobs in business establishments providing goods and services to the contractors, and the resulting indirect or generated employment. Based on economic multipliers for principal sectors of the New York City and New York State economies developed by the New York State Office of Planning Coordination and on experience from comparable major development projects, total direct and generated jobs resulting from the construction expenditures are estimated at a total of about 6,590 person-years of employment within New York State, of which 5,420 person- years of employment are within New York City.

Construction activity will also generate substantial tax revenues for New York State and City. Taking into account indirect expenditures, total economic activity resulting from construction is estimated at $483.0 million in New York State; $363.3 million of which would be spent within New York City.

While direct expenditures by the MTA are not taxable, based on aggregate data on economic activity and tax receipts for the New York State and New York City economies developed by the New York City Office of Management and Budget for use in evaluating other development projects, it is estimated that tax revenues from construction activity will equal approximately 4.2 percent of the projected total economic activity in New York State. Of these tax revenues, the largest portion will come from personal income taxes and from sales and corporate taxes on direct and induced economic activity. New York State will receive approximately $14.6 million (72 percent) and New York City will receive approximately $5.7 million (28 percent) of the tax revenues generated by construction. In total, construction of the project is estimated to generate approximately $20.3 million in tax revenues for New York City and New York State.

<u>Other Capital Expenditures</u>. Capital expenditure for rolling stock required under the alternative are approximately $212.6 million (in 1983 dollars, exclusive of expenditures for rolling stock necessary to service existing improvements).

<u>Operations</u>. Total operating costs for this alternative are estimated at $27.06 million (1983) and will require the addition of an estimated 542 new Transit Authority and Long Island Rail Road employees. Based on typical economic multipliers for sectors of the New York City and New York State economies developed from similar expenditures (New York State Office of Planning Coordination), these operations and maintenance expenditures would generate additional employment for a total of 770 jobs in New York City and State.

Tax revenues generated by the direct and indirect activity will be approximately $2.1 million per year. The largest expected increase will derive from personal income taxes on wages and salaries.

Business Displacement and Disruption. This option will require a greater level of displacement than the Montauk Transfer alternative resulting from construction activity in Richmond Hill, at the proposed Woodhaven Boulevard Station, at the proposed Fresh Pond Road Station and at the Greenpoint Avenue grade crossing separation. (Refer to Figure 5-2.) In Richmond Hill at Lefferts Boulevard and Jamaica Avenue where the Montauk Line will connect with the Archer Avenue subway, Lots 77-79 will be seriously disrupted (see Figure A.9-15). The businesses disrupted in Lot 79 are Triangle Pharmacy, Kim's Fruit and Vegetable Stand, L & J Car Service and a dog grooming shop. The Triangle Deli is another impacted business. Together these businesses employ 32 people. It is assumed that all these jobs will be displaced.

Construction of the Woodhaven Boulevard Station will involve removal of a small concrete block addition to a building on Lot 46 in Figure A.9-18. The small building is adjacent to the warehouse of All-Borough Distribution, Inc. Loss of this structure is not likely to be significantly disruptive to existing business. Construction of the Woodhaven Boulevard Station will alter access to adjacent industrial properties but alternative access is available and impacts will consequently not be substantial.

The construction of the Fresh Pond Road Station will also displace some businesses (Lots 18, 22, 23, 38 and 39 on Figure A.9-17). The displaced businesses are Trans-Tech Transmissions, Buy Rite Tire, Levick Brothers Chrysler Car Showroom, Arties Newstand and Middle Village Auto Sales. These displaced firms employ a total of 31 people. Lindy's Cab on Metropolitan Avenue could also be affected because a portion of its parking area could be acquired.

Under Montauk/Archer more firms are impacted at the Greenpoint Avenue grade separation than under Montauk Transfer. Because a new track has to be added to the Montauk Line under Montauk/Archer, the existing access road along the tracks to Marlyn Warehousing is eliminated, and a new road has to be built. That new road will cross several industrial properties: Tanks Alot Co. which is unoccupied, Anton Noll, Inc. at 37-50 Railroad Avenue (both of the preceding firms are on Lot 263 on Figure A.9-10), Accure & Tinny at 30-70 Railroad Avenue (Lot 270) and Hope Resource Recovery (Lot 272 and 279) which also appears inactive. Assuming a worst case for this analysis, it is assumed that all those firms will be displaced.

A total of 163 jobs could potentially be displaced by this alternative.

Disruption associated with demolition of the Jamaica Avenue Elevated may adversely impact the Jamaica Avenue commercial strip in Woodhaven and Richmond Hill. Although demolition will extend for a total of one and a half years, it will be accomplished in block segments; each of approximately two weeks. As a result, each block of stores will be subject to construction impacts for two weeks. Stores around existing subway stations that cater to commuters could be more substantially affected. However, there are few establishments which are heavily reliant on this type of business.

Secondary Development. The transit services provided under this alternative will contribute towards improving the business climate in the borough but will not stimulate significant new commercial or industrial development.

Access for workers to existing industrial establishments in Long Island City and in Maspeth and Glendale will be improved. For the most part, these are thriving industrial districts with high occupancy rates and expanding businesses. These areas will not experience substantial additional growth as a result of the transit improvements.

The outlook for commercial development in Long Island City may be somewhat improved as compared to the Montauk Transfer since access to this area would be improved to the large available labor pool in Queens. However, the location of the transfer station in the Sunnyside Yard surrounded by industrial uses along with general market conditions will limit commercial development possibilities.

Existing development proposals in Jamaica could be given further impetus by this alternative which most fully utilizes the new Archer Avenue subway.

While demolition of the Jamaica Elevated will not stimulate substantial new development along Jamaica Avenue, it may encourage new investments by existing businesses responding to the possibilities of an improved business climate and overall ambiance and will support existing commercial revitalization efforts.

Impacts on Freight Operations. Freight operations will be affected to a greater extent by the Montauk/Archer alternative than by the Montauk Transfer alternative. However, these impacts will not be substantial due to the construction of a third freight-only track south of the two existing tracks to accommodate peak transit hour freight deliveries and the provision for daytime access to Yard A freight customers which will permit daytime delivery of 92 percent of the existing Montauk Branch carloads. Between 11 PM and 5:30 AM, freight trains would be permitted to operate on the main tracks east of Fresh Pond. Virtually all Montauk Branch customers would receive freight at their preferred times. Six customers located in Long Island City and Maspeth would receive their freight between 11 PM and 5:30 AM instead of during the preferred evening hours between 6:30 PM and midnight. An additional company -- Gallo Wine -- will receive freight deliveries in the morning instead of their preferred time in the evening. This should not have a significant impact on the company's on-going operations.

During construction of this alternative, freight service would have to be diverted to the LIRR Main Line from the Montauk Branch for two to three months, providing delays and inconvenience to existing freight users.

5.2 Air Quality

The proposed project alternatives could potentially result in air quality impacts due to both operation and construction. In terms of operation the only potentially significant impacts will occur along feeder streets to stations where new or expanded service would result in increased traffic (See Section 3.6). In the following sections a microscale carbon monoxide analysis is presented which examines potential operational impacts at four receptor sites for "worst case" conditions. In terms of construction an analysis is presented which examines potential air quality project impacts.

5.2.1 Microscale Carbon Monoxide Analysis

5.2.1(a) Introduction

Air pollution analysis employs models -- mathematical devices which convert estimates of traffic, meteorology, and geometry into estimates of pollutant concentrations. The carbon monoxide analysis for the proposed project used a modeling approach that has been widely applied in evaluating the air quality impacts of projects in New York City, New York State, and throughout the country, and coupled this approach with a series of worst-case assumptions relating to meteorology, traffic, background levels, etc. This methodology results in a conservative estimate of expected carbon monoxide concentrations and resulting air quality impacts due to the project. These various factors are described in the following sections.

5.2.1(b) Receptor Sites

Four receptor sites on the streets adjacent to the project site were selected for detailed study. The location and characteristics of the receptor sites are described in Section 3.6.4.

Carbon monoxide concentrations at Site 1, located at Francis Boulevard near 248th Street, Site 2, located at Farmers Boulevard at Henderson Avenue, and Site 3, located at Springfield Avenue near Jamaica Avenue, would be affected by the Montauk Transfer alternative. Concentrations at Site 4, located at Fresh Pond Road near Metropolitan Avenue, would be affected by the Montauk/Archer Avenue alternative. The Queens Bypass Express and Queens Boulevard Local Line Connection alternatives are not expected to result in any significant changes in vehicular traffic and consequently carbon monoxide concentrations with these two alternatives will not be significantly different from concentrations with the No Additional (i.e. no-build) alternative.

5.2.1 (c) Worst-Case Meteorological Conditions

In general, the transport and concentration of pollutants from vehicular sources are influenced by three principal meteorological factors: wind direction, wind speed, and atmospheric stability. Wind direction influences the accumulation of pollutants at a particular receptor location. Wind direction was chosen to maximize pollutant concentrations at each of the prediction sites. In applying the HIWAY-2 model, maximum concentrations were normally found when the wind was assumed to blow approximately parallel to the roadway. Generally, low wind speeds limit the dispersion of emitted pollutants from highway sources and increase downwind concentrations. Higher wind speeds increase dispersion and decrease pollutant concentrations. All predictions were made assuming low wind speed conditions.

Stability is a measure of atmospheric turbulence. If the atmosphere is stable, little vertical mixing of pollutants at different altitudes occurs and pollutant concentrations tend to increase. Conversely, under unstable atmospheric conditions, vertical mixing of pollutants is enhanced and resultant ground level concentrations tend to decrease. Generally, the atmosphere in urban environments tends to be relatively unstable due to increased mechanical and thermal turbulence caused by the roughness of the urban terrain and other factors. All predictions were made assuming neutral atmospheric conditions.

Following the recommendations contained in the EPA-developed indirect source review procedures (<u>Guidelines for Air Quality Planning and Analysis, Volume 9 (Revised): Evaluating Indirect Sources</u>, Publication No. EPA-450/4-78-001, Research Triangle Park, North Carolina), carbon monoxide computations were performed using a wind speed of one meter/second, stability class D, and assuming a persistence factor of 0.7 for the eight-hour computations. In addition, to be conservative, a 30 degree Fahrenheit ambient temperature was assumed for the computations. At each receptor location, the wind angle which maximized the pollutant concentrations was used in the analysis regardless of frequency of occurrence.

5.2.1 (d) <u>Analysis Year</u>

The carbon monoxide analysis was performed for the first year that new or expanded service would be expected, that could result in increased traffic at the site. For site 1, 2 and 3 the analysis year is 1995. For site 4 the analysis year is 1997. The traffic used in the analyses is based upon full expected travel during the analysis year. Use of the first year results in analyses with maximum vehicle emissions and produces maximum predicted concentration, hence maximum impacts. In later years, due to federally-mandated vehicular emission requirements along with vehicle turnover, carbon monoxide concentrations are expected to decrease.

5.2.1 (e) <u>Vehicle Emissions Data</u>

In order to predict ambient concentrations of pollutants generated by vehicular traffic, emissions from vehicle exhaust systems must be estimated accurately. As described previously, the methodology detailed in the EPA developed mobile source emissions procedures was used to accomplish this.

Using this methodology, emission estimates were made for seven classes of motor vehicles: light-duty, gasoline-powered vehicles (automobiles); light-duty, diesel-powered vehicles (automobiles); light-duty, gasoline-powered vehicles (taxis); light-duty, gasoline-powered trucks; light-duty, diesel-powered trucks; heavy-duty, gasoline-powered vehicles; and heavy-duty, diesel-powered vehicles. For automobiles, taxis, and light-duty, gasoline-powered trucks, emission estimates account for three possible vehicle operating conditions: cold-vehicle operation; hot-start operation; and hot-stabilized operation. Vehicle operating conditions used in the no-build emission calculations were obtained based upon data supplied by the New York City Department of Air Resources and data for Queens supplied by the Tri-State Regional Planning Commission, now the New York Metropolitan Transportation Council. Table 5-2 shows the conditions used in the analysis for existing conditions.

All project-generated arriving autos were assumed to be operating in the hot stabilized mode and all departing autos were assumed to be operating in the cold mode. All taxis were assumed to be operating in the hot stabilized mode. Emission estimates were based on implementation of the New York State inspection and maintenance (I&M) program begun for autos in January 1982, and for taxis in

TABLE 5-2

BASE TRAFFIC VEHICLE OPERATING CONDITIONS

Autos	
% Cold (Non Cat.)	20.6
% Cold (Cat.)	26.3
% Hot (Cat.)	8.2
Light-Duty Gasoline Trucks	
% Cold (Non Cat.)	4.1
% Cold (Cat.)	5.4
% Hot (Cat.)	50.5

October 1977. The I&M program requires inspections of automobiles, taxis, and light duty trucks to determine if carbon monoxide and hydrocarbon emissions from the vehicles' exhaust systems are below strict emission standards. Vehicles failing the emissions test must undergo maintenance and pass a re-test in order to be registered in New York State. An I&M stringency of 30 percent and identification rate of 50 percent was assumed for both analysis years. Heavy-duty vehicle emission estimates reflect local engine displacement and vehicle loading characteristics. No credits were taken for anticipated future dieselization of the heavy-duty truck fleet. Light-duty truck emissions were based on an assumed 67 percent-33 percent split between trucks weighing less than 6,000 pounds, and trucks weighing 6,000 to 8,500 pounds.

5.2.1 (f) Traffic Data

Traffic data for the air quality analyses were derived from traffic counts and other information developed as part of the project's traffic analysis. For the microscale carbon monoxide air quality analysis, for Sites 1, 3 and 4, the peak one-hour period is 5-6 pm, and for Site 2 the peak one-hour period is 6-7 pm. This is the time period when predicted concentrations are expected to be greatest and when the project would be expected to have the maximum impact. The peak eight-hour concentration was determined by applying a persistence factor of 0.7.

5.2.1(g) Background Concentrations

"Background" concentrations are those pollutant concentrations not directly accounted for through the modeling analysis (the modeling analysis directly accounts for vehicular-generated emissions on the streets immediately adjacent to the receptor location). Background concentrations must be added to modeling results to obtain total pollutant concentrations at a prediction site.

Carbon monoxide background concentrations used in this analysis were 3.1 and 2.0 parts per million (ppm) for the 1995 one- and eight-hour predictions, respectively, and 3.0, and 1.9 ppm for the 1997 one-and eight-hour predictions, respectively. These background values were obtained based on the second highest one-hour and eight-hour carbon monoxide concentrations measured in 1982 at the New York State Department of Environmental Conservation's (DEC) Queens College monitoring station, adjusted to reflect the reduced vehicular emissions expected in the analysis year. For purposes of this adjustment, it was assumed that 10 percent of the background value is due to stationary source emissions which remain unchanged with time, and 90 percent of the background value is due to mobile sources which decrease with time.

5.2.1 (h) Generalized Existing Conditions

Table 5-3 shows existing carbon monoxide air quality data measured at the NYS Department of Environmental Conservation (DEC) monitoring station in Queens. In 1982, carbon monoxide concentrations were measured at only one station in Queens, located at Queens College. This station recorded roof top values and thus is indicative of existing background levels. The second highest one-hour concentration measured at the Queens College monitoring station was 6.9 ppm, and the second highest eight-hour concentration was 4.5 ppm. Both of these values are significantly below the standards.

Table 5-3 also shows existing carbon monoxide air quality data measured at the DEC monitoring stations on East 45th Street and on Canal Street in Manhattan. These values, measured at street level, show that, in general, the one-hour carbon monoxide standard is not exceeded; however, the eight-hour standard is exceeded by a significant amount. These carbon monoxide concentrations are representative of the values that would be expected at the present time in heavily trafficked areas of Manhattan and other parts of New York City when adverse meteorological conditions are present. Significant improvements are expected in the near future due to increasing numbers of federally mandated lower emission vehicles entering the vehicle fleet, as older, higher polluting vehicles are retired (i.e., "vehicle turnover") and as the benefits of implementation of the New York Inspection and Maintenance (I&M) program are achieved.

TABLE 5-3

1982 AIR QUALITY DATA

Carbon Monoxide	Standard	Queens Queens College	Manhattan 110 East 45th St.	350 Canal Street
Max. 8-Hour Avg.	9 ppm	5.1/4.5	11.2/11.2	15.4/13.0
Max. 1-Hour Avg.	35 ppm	7.2/6.9	21.3/18.4	22.0/21.8

Notes: Values shown are 1st Max./2nd Max.
Source: New York State Department of Environmental Conservation, "New York State, Air Quality Report: Continuous and Manual Air Monitor Systems - Annual 1982."

The values shown in Table 5-3 are representative of the range of possible carbon monoxide levels that may be currently present in Queens. Due to the absence of highly congested conditions similar to those experienced at the E. 45th and Canal Streets monitoring sites, current street-level concentrations at the project's four receptor sites are most likely similar in magnitude to the values at the Queens College site, with maximum one-and eight-hour carbon monoxide concentrations, both, well below standards.

5.2.1 (i) Results

Table 5-4 shows maximum predicted one- and eight-hour carbon monoxide concentrations in the analysis year (i.e. 1995 for Sites 1,2 and 3, and 1997 for Site 4) at each of the four receptor sites. Values are shown for the no build (i.e. No Additional Construction) and build (i.e. for Sites 1, 2 and 3 Montauk Transfer and for Site 4 Montauk/Archer Avenue Connection) alternatives.

All of the no-build and build values are substantially below the one-and eight-hour carbon monoxide standards. The low predicted values reflect the reduced emission values expected in the future due to vehicle turnover and the benefits of implementation of the State I&M program. In addition, at all sites the maximum increase in concentrations (i.e. the difference between the build and no-build values) are well within de minimis values. Consequently, it can be concluded that in terms of microscale carbon monoxide concentrations, none of the proposed project alternatives will have a significant impact.

TABLE 5-4

MAXIMUM ONE- AND EIGHT-HOUR PREDICTED
CARBON MONOXIDE CONCENTRATIONS(1) IN THE ANALYSIS YEAR(2)

Site	Location	One-Hour		Eight-Hour	
		No-Build	Build(3)	No-Build	Build(3)
1	Francis Lewis Blvd. near 248th Street	4.6	5.1	3.1	3.4
2	Farmers Boulevard at Henderson Avenue	4.9	5.2	3.3	3.5
3	Springfield Avenue near Jamaica Avenue	4.5	4.7	3.0	3.1
4	Fresh Pond Road near Metropolitan Avenue	4.4	5.0	2.9	3.3

Notes:
1. All values in parts per million (ppm).
2. Analysis year is 1995 for Sites 1, 2 and 3, and 1997 for Site 4.
3. Build Values for Sites 1, 2 and 3 are for the Montauk Transfer alternative, and for Site 4, the Montauk/Archer alternative.

5.2.2 Consistency With the State Implementation Plan (SIP)

While the build alternatives will result in some shifting in traffic, as shown in the previous section, no significant changes in carbon monoxide concentration are expected. In addition, the build alternatives, by providing newer, faster, more comfortable rail service will act as a deterrent to people abandoning mass transit and switching to private autos. Consequently, the build alternatives will be consistent with both the goals and strategies contained in the SIP.

5.2.3 Impacts During Construction

The no additional construction or no-build alternative would have no impact during construction. The remaining four build alternatives would all have air quality impacts as described below.

5.2.3 (a) Types of Impacts

Possible impacts on local air quality during construction of the proposed project include:

- Fugitive dust (particulate) emmissions from excavation; and

- o Mobile source emissions, including hydrocarbons, nitrogen oxide, and carbon monoxide emissions, from construction workers' private vehicles, from disruptions in traffic near the construction site, and from construction equipment at the construction site.

Impacts from these sources are expected to be minimal and similar to that of other major construction projects in the City. Construction activities will be conducted with the care mandated by the site's proximity to active use. Appropriate control measures will be employed to minimize impacts.

5.2.3 (b) Control Measures

Fugitive Dust. The following measures, including adherence to Section 1402.2-9.11 of the New York City Air Pollution Code, will be utilized to prevent fugitive dust from construction and the limited demolition activities from becoming airborne.

- o Use of water or chemicals to control dust in the demolition of existing buildings or structures, and other construction operations;

- o Covering, at all times when in motion, open-body trucks transporting materials likely to give rise to airborne dust; and

- o The prompt removal of earth or other material from paved streets.

Application of these measures will ensure significant reduction in fugitive dust emissions.

Mobile Source Emissions. The following measures will be used to minimize localized increases in mobile source emissions:

- o Idling of delivery trucks or other equipment will not be permitted during periods when they are being unloaded or are not in active use;

- o Existing number of traffic lanes will be maintained to the maximum extent possible; and

- o Construction requiring temporary street closings for the relocation of utilities and for other purposes in heavily traveled areas will be performed, to the maximum extent practicable, during off-peak hours.

5.3 Noise and Vibration

5.3.1 Noise

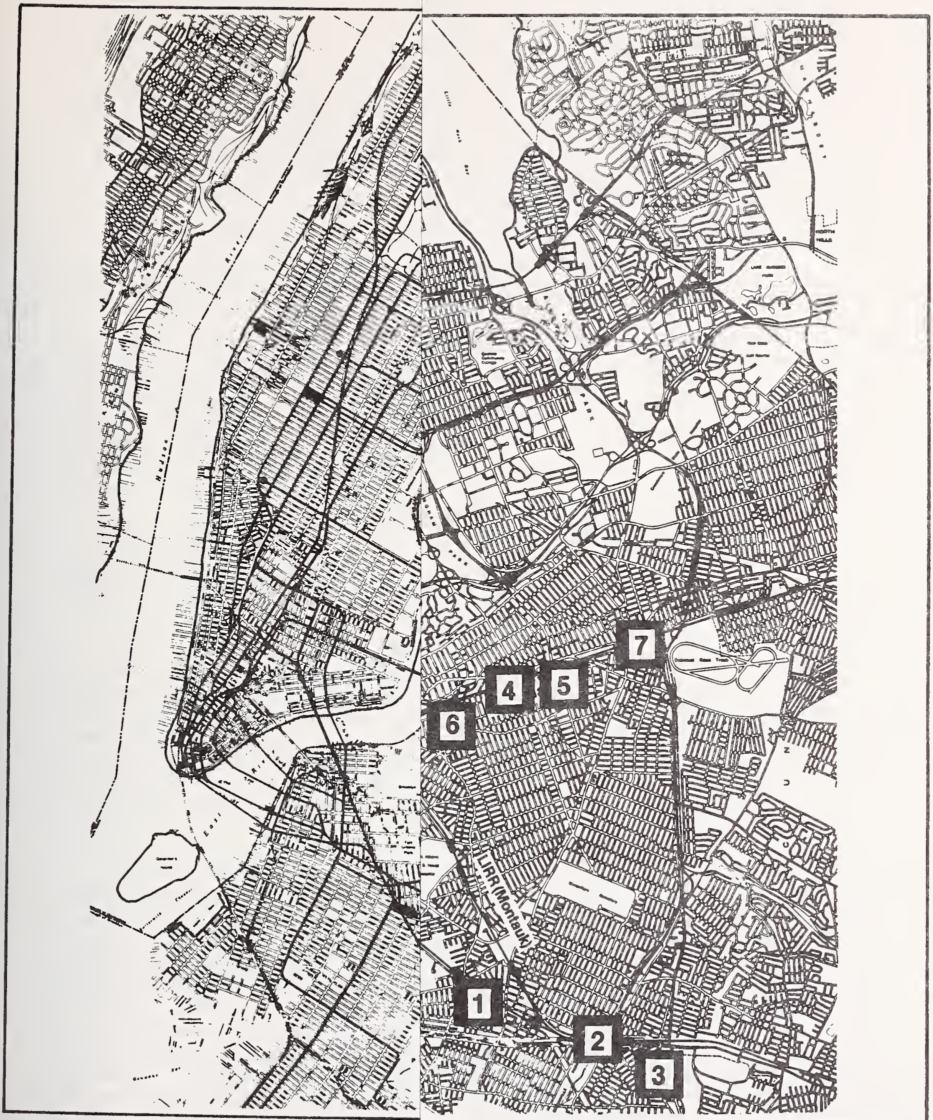
Community noise exposure from trains operating on surface tracks is one of the most important environmental parameters to be considered in planning new or expanded transit facilities. The main sources of noise from trains operating on surface tracks (i.e., including depressed, at-grade,and elevated tracks) are:

- o wheel/rail interaction -- the noise produced from the steel train wheels rolling on steel rails;
- o propulsion equipment -- in particular the traction motors and reduction gears of the train;
- o structure vibration -- wayside noise produced by the vibration of the rails transmitted through the rail fastening system into the transit structure; and
- o auxiliary equipment -- compressors, air handling equipment, braking systems, motor generator sets, etc.

Noise levels for the various project alternatives were determined by adjusting the measured existing noise levels to account for changes in vehicular traffic and changes in rail traffic. In addition, several mitigation measures are proposed to account for planned noise reduction. These measures include the use of acoustically quieter trains, trackbed and rail support improvements, wheel truing and rail grinding programs, and the use of sound barriers and other obstructions for acoustical shielding. In general, newer, acoustically quieter rail cars can result in noise level reductions of two to six dBA. In addition, rapid transit trains are approximately ten dBA quieter than diesel trains; trackbed and rail support improvements can result in noise reductions of five to 15 dBA; and, sound barriers can result in noise reductions of five to 15 dBA and, in special cases, noise reductions as much as 25 to 30 dBA (Handbook of Urban Rail Noise and Vibration Control, PB 82-220757, Transportation Systems Center, Cambridge, MA, February 1982). In performing analyses, it was assumed that these noise reduction measures would only be implemented with the various "build" alternatives and that no significant noise reduction measures beyond those currently being implemented would occur for the additional construction alternative. In addition, it was assumed that implementation of all the proposed noise reduction measures, mentioned above, would produce a maximum noise reduction of 20 dBA; new, quieter cars, trackbed and rail support improvements, and wheel truing and rail grinding would produce a maximum noise reduction of six dBA; and new, quieter cars and wheel truing and wheel grinding would produce a noise reduction of one dBA. A description of the methodology for predicting noise levels is discussed in the Technical Supplement.

The noise analysis which follows examines the impact of each of the five project alternatives (i.e. the No Additional Construction alternative, the Queens Bypass Express alternative, the Queens Boulevard Line Local Subway Connection alternative, the Subway/LIRR-Montauk Transfer alternative, and the Montauk/Archer Avenue Connection alternative) on community noise levels. Noise levels were calculated at each of the 21 noise measuring sites shown on Figure 5-5.

The analysis presented in this section found that the No Additional Construction, the Queens Bypass Express and the Queens Boulevard Line Local Connection alternatives would result in noise levels that are essentially the same as existing levels. Thus, the Queens Bypass Express and the Queens Boulevard Line Local Connection alternatives do not have significant noise



See Table 3-24

INDEX FOR NOISE MONITORING SITES

Figure 5-5

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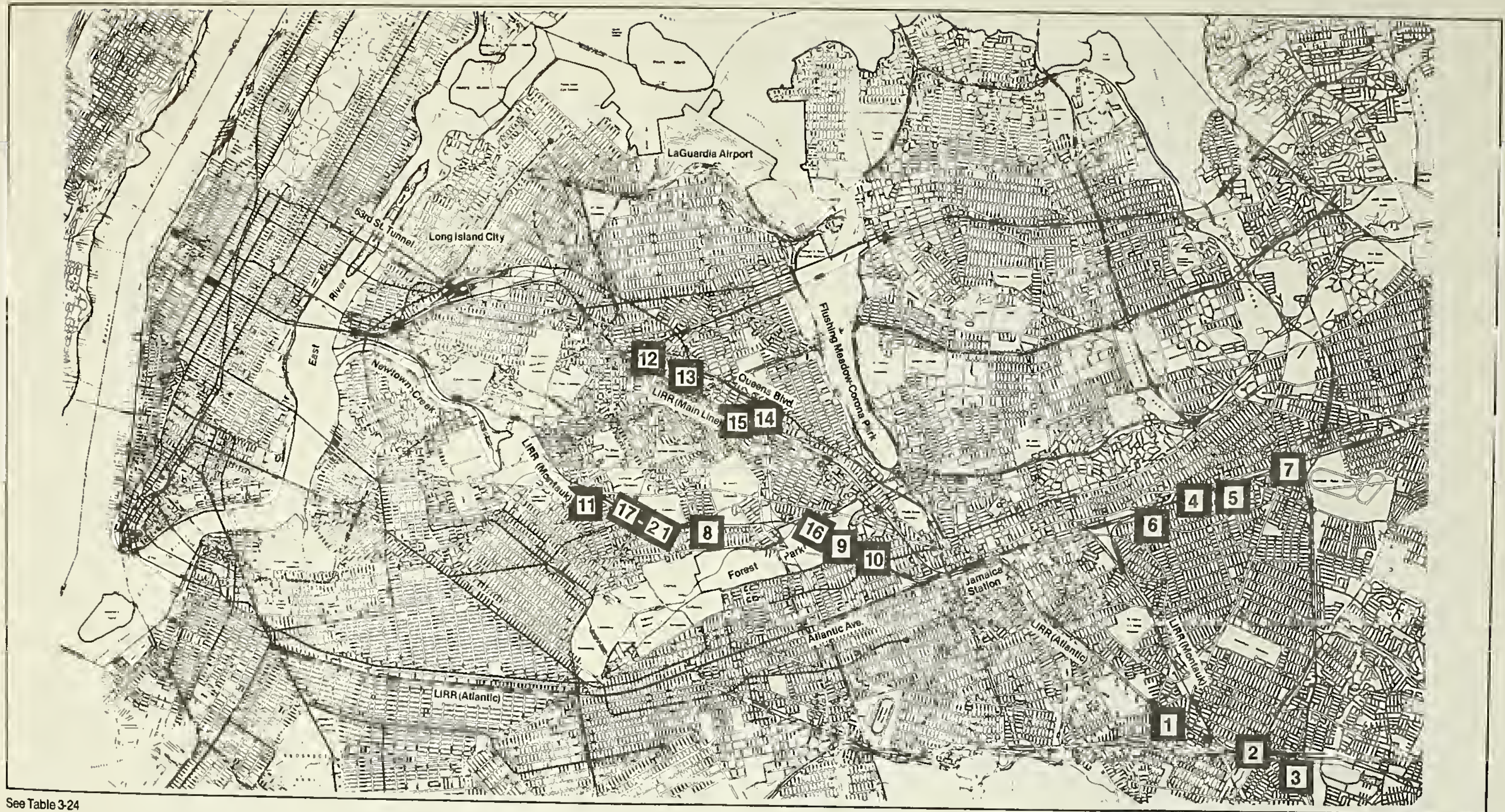


See Table 3-24

INDEX FOR NOISE MONITORING SITES

Figure 5-5

impacts. The two Montauk alternatives have greater impacts and they are described in the following sections of this chapter. There would be increases in maximum noise levels at various places along the Montauk Line. Levels at a specific receptor site are representative of conditions along the line in the vicinity of that site.

5.3.1 (a) Findings

Tables 5-5, 5-6 and 5-7 show predicted noise levels for the various project alternatives at each of the 21 analysis sites.

Table 5-5 shows 24-hour equivalent ($L_{eq(24)}$) and day-night (L_{dn}) noise levels. In all cases the $L_{eq(24)}$ and L_{dn} noise levels for the various "build" alternatives are less than three dBA higher than the noise levels for the No Additional Construction alternative. In fact, in some cases noise reduction measures incorporated into the build alternatives result in noise levels for build alternatives that are less than the values for the no-build alternative. In all cases, any increase in $L_{eq(24)}$ or L_{dn} would not be perceptible to most people and are insignificant.

Table 5-6 shows the maximum hourly equivalent noise level ($L_{eq(1)}$), regardless of hour, for each alternative. Maximum one-hour equivalent noise levels for the build alternatives are not significantly increased compared to the maximum one-hour equivalent noise levels for the no-build alternative.

Table 5-7 shows the maximum increase in hourly equivalent noise levels for "Build" alternatives. These increases are the maximum difference obtained by subtracting the no-build from the build one-hour equivalent noise levels for each hour of the day and night. With the exception of the seven sites discussed below, all of these differences are less than three dBA and, consequently, these differences would not be perceptible to most people and are insignificant. Again, in some cases noise reduction measures result in lower noise levels for the build options than for the No Additional Construction alternative.

The exceptions are for seven sites -- 8, 9, 16, 17, 18, 20 and 21. At Site 8, located at 77th Avenue at 79th Place, for the Montauk/Archer alternative, there are three hours when $L_{eq\ (1)}$ noise levels increase by three dBA or more. During the 7 to 8 AM hour, the number of train cars passing this location increases from zero for No Additional Construction to 240 for Montauk/Archer and noise levels even with the proposed mitigation increase by 3.8 dBA. During the 11 AM to noon hour, the number of train cars passing this location increases from zero for No Additional Construction to 96 for Montauk/Archer and noise levels even with the proposed mitigation increase by 7.7 dBA. Similarly, during the 1 to 2 PM hour the number of train cars passing this location increases from zero for No Additional Construction to 96 for Montauk/Archer and noise levels even with the proposed mitigation increase by 7.9 dBA. These increases will be perceptible. Consequently the impact can be considered to be within the significant range. During all of the remaining hours of the day and night, noise levels for the build alternatives are less than three dBA higher than the no-build alternative, and the increases are insignificant. In addition, during many hours, due to proposed

TABLE 5-5

24-HOUR EQUIVALENT ($L_{eq(24)}$) AND DAY-NIGHT (L_{dn}) NOISE LEVELS FOR PROJECT ALTERNATIVES

Site	Location	No Additional Construction		Queens Bypass Express		Local Connection		Montauk Transfer		Montauk/Archer	
		$L_{eq(24)}$	L_{dn}	$L_{eq(24)}$	L_{dn}	$L_{eq(24)}$	L_{dn}	$L_{eq(24)}$	L_{dn}	$L_{eq(24)}$	L_{dn}
1.	Westgate St. at 137th Ave.	64.3	68.0	64.3	68.0	64.3	68.0	65.3	68.8	64.3	68.0
2.	North Conduit Ave. near 233rd St.	70.8	74.1	70.8	74.1	70.8	74.1	71.1	74.5	70.8	74.1
3.	Francis Lewis Blvd. near 248th St.	63.9	68.6	63.9	68.6	63.9	68.6	64.7	69.4	63.9	68.6
4.	202nd St. near Jamaica Ave.	66.8	73.4	66.8	73.4	66.8	73.4	67.3	73.3	66.8	73.4
5.	99th Ave. near 209th St.	73.1	77.2	73.1	77.2	73.1	77.2	73.6	77.0	73.1	77.2
6.	Farmers Blvd. at Henderson Ave.	66.5	69.0	66.5	69.0	66.5	69.0	67.1	69.7	66.5	69.0
7.	Springfield Blvd. near Jamaica Ave.	68.3	70.7	68.3	70.7	68.3	70.7	69.1	71.5	68.3	70.7
8.	77th Ave. at 79th Pl.	63.8	68.6	63.8	68.6	63.8	68.6	59.2	63.1	60.2	63.9
9.	Babbage St. near 115th St.	75.1	79.2	75.1	79.2	75.1	79.2	71.2	74.6	73.1	75.6
10.	Lefferts Blvd. at Jamaica Ave.	83.9	88.7	83.9	88.7	83.9	88.7	83.3	88.3	74.4	76.1
11.	Fresh Pond Rd. near Metropolitan Ave.	64.5	67.2	64.5	67.2	64.5	67.2	64.5	67.2	65.7	68.4
12.	Kneeland Ave. at Ireland St.	56.9	60.3	53.8	57.2	56.9	60.3	56.9	60.3	56.9	60.3
13.	Haspel St. at 56th Ave.	67.2	70.0	64.1	66.9	67.2	70.0	67.2	70.0	67.2	70.0
14.	Austin St. at 67th Ave.	68.8	71.4	66.3	68.5	68.8	71.4	68.8	71.4	68.8	71.4
15.	Alderton St. at 63rd Dr.	63.9	66.7	60.3	63.3	63.9	66.7	63.9	66.7	63.9	66.7
16.	Forest Park	50.2	56.0	50.2	56.0	50.2	56.0	46.0	51.5	48.9	54.5
17.	Traffic Avenue at 64th Street	64.3	66.7	64.3	66.7	64.3	66.7	61.3	64.9	62.1	65.3
18.	Glen Ridge Park	63.5	65.1	63.5	65.1	63.5	65.1	59.4	62.1	60.2	62.6
19.	Otto Road at 68th Street	64.9	65.9	64.9	65.9	64.9	65.9	63.0	64.3	63.0	64.3
20.	Christ the King High School	58.3	60.3	58.3	60.3	58.3	60.3	55.4	58.7	56.0	58.7
21.	Admiral Avenue	63.4	64.3	63.4	64.3	63.4	64.3	59.1	60.6	60.0	61.3

Note: All values in dBA

TABLE 5-6

MAXIMUM HOURLY EQUIVALENT NOISE LEVELS* ($L_{eq(1)}$) FOR PROJECT ALTERNATIVES

Site	Location	No Additional Construction	Queens Bypass Express	Local Connection	Montauk Transfer	Montauk/Archer
1.	Westgate St. at 137th Ave.	68.6	68.6	68.6	69.5	68.6
2.	North Conduit Ave. near 233rd St.	76.3	76.3	76.3	76.4	76.3
3.	Francis Lewis Blvd. near 248th St.	66.7	66.7	66.7	67.4	66.7
4.	202nd St. near Jamaica Ave.	71.2	71.2	71.2	70.8	71.2
5.	99th Ave. near 209th St.	78.9	78.9	78.9	78.5	78.9
6.	Farmers Blvd. at Henderson Ave.	71.8	71.8	71.8	72.3	71.8
7.	Springfield Blvd. near Jamaica Ave.	74.6	74.6	74.6	75.2	74.6
8.	77th Ave. at 79th Pl.	74.3	74.3	74.3	68.3	67.3
9.	Babbage St. near 115th St.	84.1	84.1	84.1	78.4	81.6
10.	Lefferts Blvd. at Jamaica Ave.	87.8	87.8	87.8	87.3	84.2
11.	Fresh Pond Rd. near Metropolitan Ave.	68.4	68.4	68.4	68.4	69.5
12.	Kneeland Ave. at Ireland St.	64.2	60.2	64.2	64.2	64.2
13.	Haspel St. at 56th Ave.	73.0	68.9	73.0	73.0	73.0
14.	Austin St. at 67th Ave.	75.8	72.9	75.8	75.8	75.8
15.	Alderton St. at 63rd St.	71.9	67.9	71.9	71.9	71.9
16.	Forest Park	60.6	60.6	60.6	50.8	53.8
17.	Traffic Avenue at 64th Street	74.3	74.3	74.3	64.6	67.3
18.	Glen Ridge Park	74.3	74.3	74.3	64.6	67.3
19.	Otto Road at 68th Street	74.3	74.3	74.3	68.0	68.0
20.	Christ the King High School	68.3	68.3	68.3	58.6	61.3
21.	Admiral Avenue	74.3	74.3	74.3	64.6	67.3

* Regardless of Hour

Note: All values in dBA

TABLE 5-7

MAXIMUM INCREASE IN HOURLY EQUIVALENT NOISE LEVELS ($L_{eq(1)}$) FOR "BUILD" ALTERNATIVES

Site	Location	Queens Bypass Express	Local Connection	Montauk Transfer	Montauk/Archer
1.	Westgate St. at 137th Ave.	0.0	0.0	2.6	0.0
2.	North Conduit Ave. near 233rd St.	0.0	0.0	2.2	0.0
3.	Francis Lewis Blvd. near 248th St.	0.0	0.0	1.9	0.0
4.	202nd St. near Jamaica Ave.	0.0	0.0	2.8	0.0
5.	99th Ave. near 209th St.	0.0	0.0	2.8	0.0
6.	Farmers Blvd. at Henderson Ave.	0.0	0.0	1.4	0.0
7.	Springfield Blvd. near Jamaica Ave.	0.0	0.0	2.3	0.0
8.	77th Ave. at 79th Pl.	0.0	0.0	1.1	7.9
9.	Babbage St. near 115th St.	0.0	0.0	2.2	4.9
10.	Lefferts Blvd. at Jamaica Ave.	0.0	0.0	0.1	-2.2
11.	Fresh Pond Rd. near Metropolitan Ave.	0.0	0.0	0.0	2.3
12.	Kneeland Ave. at Ireland St.	-0.5	0.0	0.0	0.0
13.	Haspel St. at 56th Ave.	-0.2	0.0	0.0	0.0
14.	Austin St. at 67th Ave.	-0.3	0.0	0.0	0.0
15.	Alderton St. at 63rd St.	-0.2	0.0	0.0	0.0
16.	Forest Park	0.0	0.0	6.1	8.8
17.	Traffic Avenue at 64th Street	0.0	0.0	4.6	7.3
18.	Glen Ridge Park	0.0	0.0	3.6	6.3
19.	Otto Road at 68th Street	0.0	0.0	-0.2	-0.2
20.	Christ the King High School	0.0	0.0	3.6	6.3
21.	Admiral Avenue	0.0	0.0	9.6	12.3

Note: All values in dBA

noise mitigation measures, noise levels for Montauk/Archer are lower than noise levels for No Additional Construction.

At Site 9, located at Babbage Street near 115th Street, for Montauk/Archer there are two hours where $L_{eq(1)}$ noise levels increase by three dBA or more. During the 7-8 AM hour, the number of train cars passing this location will increase from zero for No Additional Construction to 240 for Montauk/Archer and noise levels even with the proposed mitigation will increase by approximately 4.9 dBA. Similarly, during the 4-5 PM hour the number of train cars passing this location will increase from two for No Additional Construction to 272 for Montauk/Archer, and noise levels even with the proposed mitigation will increase by approximately 3.3 dBA. These increases will be perceptible. In general, increases of less than five dBA result in very little community response and consequently the impact can be considered to be just within the significant range. During all of the remaining hours of the day and night, noise levels for the build alternatives are less than three dBA higher than the no-build alternative and the increases are insignificant. In addition, during many hours, due to proposed noise mitigation measures, noise levels for Montauk/Archer are lower than noise levels for No Additional Construction.

At Site 16, located in Forest Park, for both Montauk Transfer and Montauk/Archer, there are several hours when noise levels increase by three dBA or more. These increases occur because the number of train cars passing this location increases substantially (i.e. for some hours from zero or a very small quantity for No Additional Construction to 100 to 300 cars for Montauk Transfer and Montauk/Archer) and because existing park noise levels are very low. Even with the proposed noise mitigation measures, $L_{eq(1)}$ noise levels increase for Montauk Transfer as high as 6.1 dBA and $L_{eq(1)}$ noise level increases for Montauk/Archer as high as 8.8 dBA may occur at this location. While these increases are significant and will be readily noticeable, even with Montauk Transfer and Montauk/Archer, during all hours noise levels will be within the 55 dBA level recommended for parks.

At Site 17, located at Traffic Avenue at 64th Street, for both Montauk Transfer and Montauk/Archer, noise levels increase by more than three dBA during the 7-8 AM hour. During this time period the number of train cars passing this location will increase from zero for No Additional Construction to 128 cars for Montauk Transfer and noise levels even with the proposed mitigation will increase by approximately 4.6 dBA. Similarly, during this time period the number of train cars passing this location will increase from zero for No Additional Construction to 240 cars for Montauk/Archer and noise levels even with the proposed mitigation measures will increase by approximately 7.3 dBA. These increases wil be perceptible and may lead to some small number of sporadic community complaints. During all the remaining hours of the day and night, noise levels for the build alternatives are less than three dBA higher than the no-build alternative and the increases are insignificant. In addition, during many hours, due to proposed noise mitigation measures, noise levels for both the Montauk Transfer and Montauk/Archer alternatives are lower than noise levels for No Additional Construction.

At Site 18, located at Glen Ridge Park, there are three hours when noise levels increase by three dBA or more for the Montauk/Archer alternative and one hour for the Montauk Transfer alternative.

During the 7-8 AM hour the number of train cars passing this location will increase from zero for No Additional Construction to 128 cars for Montauk Transfer and 240 cars for Montauk/Archer. Even with the proposed mitigation, this results in noise level increases of 3.6 dBA for Montauk Transfer and 6.3 dBA for Montauk/Archer during this hour. During the 1-2 PM and 2-3 PM hours noise generated principally by the proposed Fresh Pond Freight Yard, and also by the increased number of trains passing this location results in noise level increases as high as 6.3 dBA for Montauk/Archer. Due to the increased number of train cars passing this location under Montauk Transfer there will be increases in noise levels as high as 3.6 dBA. These increases will be perceptible and may lead to a small number of sporadic community complaints. During all the remaining hours of the day and night, noise levels for the build alternative are less than three dBA higher than the no-build alternative and the increases are insignificant. In addition, during many hours, due to proposed noise mitigation measures, noise levels for both Montauk Transfer and Montauk/Archer are lower than noise levels for the No Additional Construction alternative.

At Site 20, located at Christ the King High School, for both Montauk Transfer and Montauk/Archer, noise levels increase by more than three dBA during the 7-8 AM hour. During this time period the number of train cars passing this location will increase from zero for No Additional Construction to 128 cars for Montauk Transfer, and noise levels even with the proposed mitigation measures will increase by approximately 3.6 dBA. Similarly, during this same time period the number of train cars passing this location will increase from zero under No Additional Construction to 240 cars under Montauk Archer, and noise levels even with the proposed mitigation measures will increase by approximately 6.3 dBA. These increases will be perceptible and may lead to a small number of sporadic community complaints. During all the remaining hours of the day and night, noise levels for the build alternative are less than three dBA higher than the no-build alternative and the increases are insignificant. In addition, during many hours, due to proposed noise mitigation measures, noise levels for both Montauk Transfer and Montauk/Archer, are lower than noise levels for No Additional Construction alternative.

Similarly, at Site 21, located at Admiral Avenue, for both Montauk Transfer and Montauk/Archer, noise levels increase by more than three dBA during the 7-8 AM hour. During this time period the number of train cars passing this location will increase from zero for No Additional Construction to 128 cars for the Montauk Transfer, and noise levels even with the proposed mitigation will increase by approximately 9.6 dBA. Similarly, during this time period the number of train cars passing this location will increase from zero for No Additional Construction to 240 cars for Montauk/Archer, and noise levels even with the proposed mitigation measures will increase by approximately 12.3 dBA. These increases will be readily noticeable and may lead to community complaints. Additional noise mitigation measures may be necessary to reduce adverse impacts for both the Montauk Transfer and Montauk/Archer alternatives at this location. These measures would have to be explored for the FEIS if either Montauk option is selected. During all the remaining hours of the day and night, noise levels for the build alternative are less than three dBA higher than the no-build alternative and the increases are insignificant. In addition, during many hours, due to proposed noise mitigation measures, noise levels for both Montauk Transfer and Montauk/Archer are lower than noise levels for the No Additional Construction alternative.

Besides the one-hour equivalent, 24-hour equivalent, and day-night noise levels, one additional parameter, the maximum passby noise level (L_{max}) is important. At some locations L_{max} values as high as 90 to 100 dBA presently are experienced. These values are intrusive. In general, the maximum passby noise level is a function of both train length and train speed. Figure 5-6 shows the variation in noise level with train length. When the distance from the track is short (as is the case for many residences which back up to the rail right-of-way), increasing the train length will only have a small effect on increasing maximum passby noise levels. Similarly, in terms of speed, the maximum passby noise levels are approximately proportional to 20 to 30 log V, where V is the train speed, and small increases in train speed have no significant effect on maximum passby noise levels. Consequently, the proposed build alternatives will not significantly increase maximum passby noise levels. In fact, in some cases noise reduction measures incorporated into the build alternatives will result in maximum passby noise levels for build alternatives that are less than the values for the no-bulid alternative. However, while the maximum passby noise levels will not increase significantly, and will in some cases be lower, it should be noted that the increased service provided with the build alternatives may result in two adverse conditions: first, there will be more of these peaks, or maximums, throughout the day and night, and these peaks, because of their intermittent nature, are intrusive; and second, in some cases trains will be running at hours when there previously were no trains or few trains and again may produce an intrusive noise impact.

Detailed hourly noise levels for each site, along with vehicular and train volumes and site-by-site discussions of noise impacts, are provided in the Technical Supplement to the DEIS.

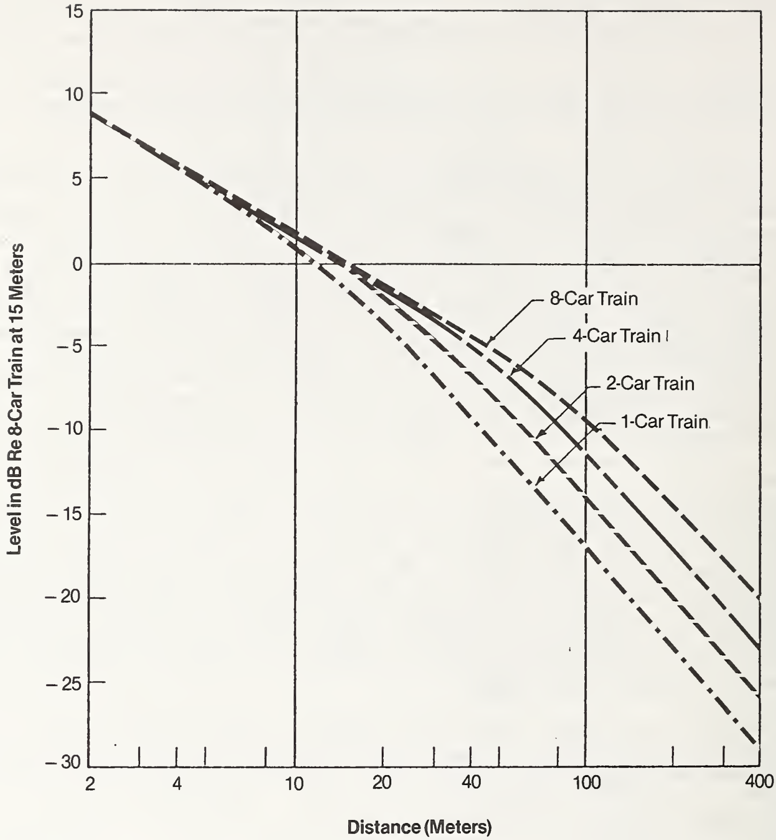
To summarize by alternative:

No Additional Construction will result in noise levels that are essentially the same as existing noise levels.

Queens Bypass Express will result in noise levels that are comparable to or lower than the No Additional Construction levels. The reductions are achieved due to proposed noise mitigation measures.

The Queens Boulevard Line Local Connection alternative will result in noise levels that are comparable to or lower than the No Additional Construction levels.

Subway/LIRR-Montauk Transfer will result in some small increases (less than 3.0 dBA) in noise levels. The sites expected to experience a signifi-



Note: Levels are in dB relative to an 8-car train at 15 m (50 ft), a transit vehicle is assumed to be 21.3 m (70 ft.) long.

NOISE LEVEL AS A FUNCTION OF TRAIN LENGTH AND DISTANCE FROM TRACK

Figure 5-6

cant increase in noise level are Sites 16, 17, 18, 20 and 21. At Site 16 in Forest Park, while there will be many significant increases in noise level (3.0 dBA or more), noise levels will remain below 55 dBA,the recommended level for park land use. At many sites, noise levels during some hours will be less than No Additional Construction levels. The reductions are achieved due to the proposed noise mitigation measures.

Montauk/Archer Avenue Subway Connection will result in significant increases (3.0 dBA or more) in noise level at Sites 9, 16, 17, 18, 20 and 21. At Site 16 in Forest Park, the values will again remain below 55 dBA, the recommended level for park land use. At many sites, during some hours, noise levels with this alternative will be less than No Additional Construction levels. The reductions are achieved due to the proposed noise mitigation measures. At Site 10, located at Lefferts Boulevard at Jamaica Avenue, the removal of the TA elevated structure on Jamaica Avenue will result in significant reductions in noise levels, due to this alternative.

As indicated in Chapter 2, Section 2.2, under the two Montauk Line alternatives, several power substations will be required -- four for Montauk Transfer and six for Montauk/Archer. These facilities will be acoustically designed so that noise levels at receptor locations adjacent to the facilities will not be significantly changed (i.e., noise levels will increase by less than 3.0 dBA). Consequently, no significant noise impacts are expected from these sources.

5.3.1 (b) Construction Noise Impacts

Impacts on community noise levels during construction of the build alternatives include noise from construction equipment and noise from construction vehicles and delivery vehicles traveling to and from the site.

The level of impact of these noise sources depends upon the noise characteristics of the equipment and activities involved, the construction schedule, and the location of potentially sensitive noise receptors.

Noise levels at a given receptor location are dependent on the type and number of pieces of construction equipment being operated, as well as the distance from the construction site. Noise levels due to construction activities will vary widely, depending on the phase of construction and the specific task being undertaken.

Increases in noise levels due to operation of delivery vehicles and other construction vehicles will, in most cases, not be significant. Increases in noise levels are expected to be found near a few defined truck routes and in the immediate vicinity of the construction site. Construction noise generated by the proposed project is expected to be similar to the noise generated by other major construction projects in the city.

Control Methods. Construction noise is regulated by the New York City Noise Control Code and by EPA noise emissions standards for construction equipment. These local and federal requirements mandate that certain classifications of construction equipment and motor vehicles meet specified noise emissions standards; that, except under exceptional circumstances, construction activities be limited to weekdays between the hours of 7 AM and 6 PM; and that construction material be handled and transported in such a manner as not to create unnecessary noise.

5.3.2 Vibration

5.3.2 (a) Introduction

The following section examines potential project impacts on vibration levels due to both construction and operation for the no build (i.e. the No Additional Construction) alternative and the four build (i.e. the Queens Bypass Express, the Queens Boulevard Line Local Connection, the Subway/LIRR Montauk Transfer, and the Montauk/Archer Connection) alternatives.

5.3.2 (b) Operational Impacts

Operational groundborne vibrations originate at the wheel at the wheel/rail interface and propagate from the track and support structure through the intervening soil and rock to nearby buildings. In general vibrations may be perceptible to humans as feelable vibration, generate annoying noise, cause general annoyance, and if it is sufficiently severe even cause damage to structures.

Various rail system components and conditions influence groundborne vibration levels. These factors include wheel/rail roughness, wheel flats, transit vehicle truck suspension, rail support and track fixation system, type of rail structure, and train speed.

Existing acceleration levels for individual wheel/axle passage were measured at eight locations and the results were presented in Table 3-15 and discussed in Section 3.7.2(e). In estimating vibratory impacts it was assumed that individual train or car groundborne vibratory acceleration forces will not increase in the future and in some cases be reduced from present measured values. This is a conservative assumption, since track bed and rail support improvements, improvements in wheel truing and rail grinding programs, and use of newer cars are all expected to result in reductions in vibratory acceleration forces for the build alternatives.

The changes in vibratory levels between existing conditions and the various project alternatives are due primarily to future improvements in wheel/rail roughness (i.e. the roughness of wheels, rails, and rail joints), truck primary suspension, and trackbed and rail supports. Wheel/rail roughness can cause significant variations in vibratory levels. On jointed track the impacts at the rail joints or from wheel flats dominate the groundborne levels. However on welded rail, wheel/rail roughness is of primary concern. Wheel/rail roughness can be controlled by grinding rails and truing wheels.

The primary suspension stiffness of the vehicle truck of the car is the most important property of the transit vehicle with respect to groundborne vibration. The primary suspension supports the truck frame on the axles, and a reduction in the primary stiffness will lead to a reduction in the dynamic load on the transit vehicles at the rail and thus to vibratory levels. Very significant reductions in groundborne vibratory levels can be achieved with newer cars.

Trackbed and rail supports also can have a significant effect on groundborne vibratory levels. Deteriorated tie and ballast can cause abrupt changes in the track elastic foundation, inturn leading to large track deflection with subsequent "bottoming out." This action can result in accelerated loosening of track joints and fastenings. Consequently trackbed and rail support improvements including the track fixation system are important in controlling groundborne vibration.

Vibratory levels at each of the eight measurement locations for each of the project alternatives are presented in Table 5-8. At Sites 1, 2, 3, and 8, although some improvements are expected, no significant changes in vibratory levels are expected; at Site 4 for the Queens Bypass Express, new resiliently fastened, welded rail will result in a reduction in vibratory levels; at Sites 5 and 6 for the Subway/LIRR-Montauk Transfer and Montauk/Archer Avenue Subway Connection, replacement of ballast and ties and installation of welded rail will result in a reduction in vibratory levels; and at Site 7 removal of the elevated Jamaica Line track at this location will reduce vibratory levels for all project options.

In general the effects of vibratory annoyance and damage are functions of acceleration levels and the number of impulse events. Figure 5-7 shows vibrational criteria for residential areas developed by the Committee on Hearing, Bioacoustics, and Biomechanics; Assembly of Behavioral and Social Sciences (CHABA) of the National Research Council.

As can be seen from Table 3-15, with the exception of Site 6, existing vibratory acceleration levels at all sites for all five project alternatives are below 0.005 meter/second and would, in general, be barely perceptible. Consequently from Figure 5-7 it can be concluded that increasing the number of rail cars or impulses per day would not increase (and in many cases future improvements may reduce) the perceived vibratory annoyance. At Site 6 existing vibratory acceleration levels are 0.006 meters/sec^2 and this level would be distinctly perceptible with less than 1 percent of adjacent residents expected to complain about daytime levels and slightly greater than 1 percent of adjacent residents expected to complain about nighttime levels. However, according to Figure 5-7 future levels are still low enough that increasing the number of rail cars or impulses per day will not increase the perceived vibratory annoyance. In addition, with Montauk/Archer and Montauk Transfer future vibratory levels at Site 6 will decrease to within the barely perceptible levels. Consequently it can be concluded that none of the proposed project alternatives would result in any increase in vibratory levels nor have a significant negative vibratory impact.

5.3.2 (c) Construction Impacts

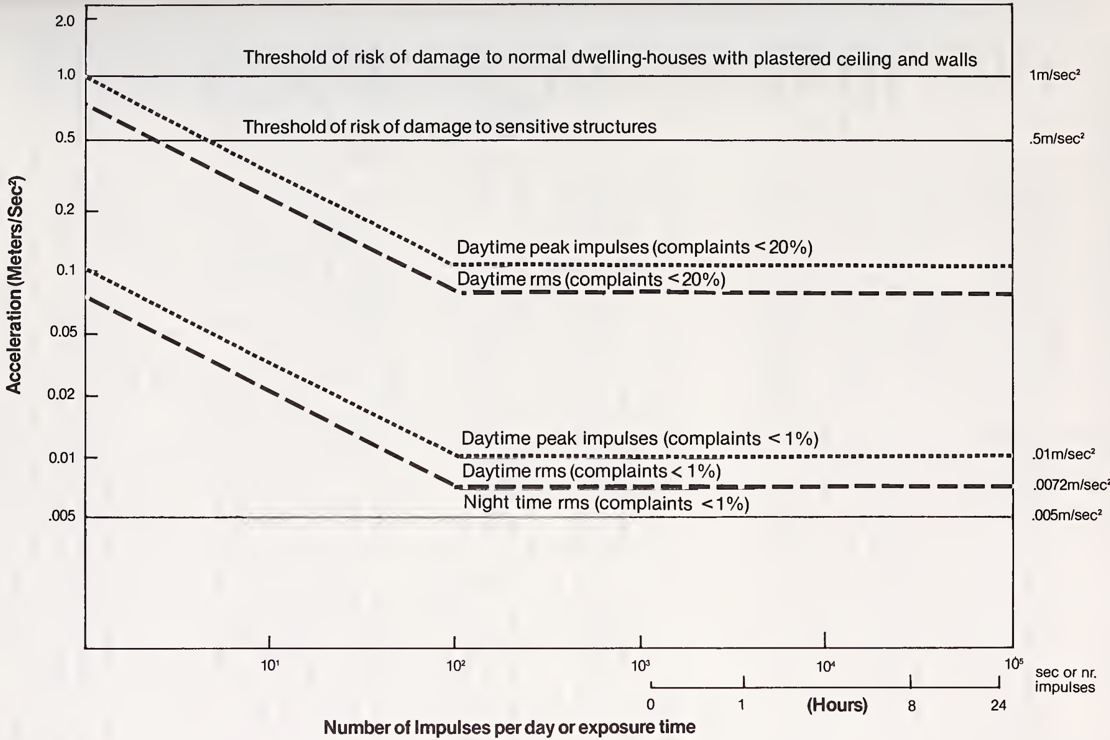
The no-build alternative would obviously have no construction impact. All four build alternatives would have approximately equal impacts on vibratory levels during construction. These impacts will be due principally

TABLE 5-8

VIBRATORY LEVELS FOR PROJECT ALTERNATIVES

(meters/second^2)

Site	Location	Existing Conditions	No Additional Construction	Queens Bypass Express	Local Connection	Montauk Transfer	Montauk/ Archer
1	N. Conduit/243rd Street	0.0024	0.0024	0.0024	0.0024	0.0024	0.0024
2	97th Avenue/220th Street	0.0043	0.0043	0.0043	0.0043	0.0043	0.0043
3	Northern Boulevard/40th Road	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027
4	Queens Boulevard/69th Road	0.0006	0.0006	0.0002	0.0006	0.0006	0.0006
5	72nd Street/Edsall Street	0.0030	0.0030	0.0030	0.0030	0.0010	0.0010
6	Babbage Street/117th Street	0.0060	0.0060	0.0060	0.0060	0.0030	0.0020
7	89th Avenue/132nd Street	0.0038	0.0036	0.0030	0.0030	0.0030	0.0030
8	Roosevelt Avenue/60th Street	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021



CHABA VIBRATION CRITERIA FOR RESIDENTIAL AREAS

Figure 5-7

to blasting, pile driving, and the operation and movement of construction vehicles.

The two items of major concern would be vibratory impacts due to blasting and pile driving. Both operations will be controlled to limit vibratory acceleration levels to below 0.5 to 1.0 meters/second depending upon structural sensitivity. These are the threshold values to avoid damage to sensitive and normal dwelling-house structures, respectively. In terms of blasting, this level will be achieved by limiting the weight of explosive used.

Groundborne vibrations from construction vehicle operation and movement, including the operations of graders, loaders, dozers, scrapers, and trucks, are the same order of magnitude as the groundborne vibration from heavy vehicles on nearby streets and roadways. Groundborne vibration from construction vehicles are generally not significant and usually do not cause complaints. These levels are usually in the imperceptible to barely perceptible range.

5.4 Water Resources

5.4.1 Introduction

Providing new transit to Queens involves no direct activities in or adjacent to surface waters but may nonetheless result in impacts to surface waters either directly or indirectly. Direct impacts may occur due to construction activities resulting in the discharge of pollutants--principally sediment--to surface waters through the City's sewer system. Indirect impacts to surface waters may occur if the availability of expanded or improved transit stimulates increased development along the transit corridor resulting in increased water use, sewage discharge and new secondary construction to accommodate growth.

The transit alternatives traverse portions of Queens that use groundwater to different degrees for water supply. Construction of subterranean portions of the transit alternatives may involve de-watering in areas where ground water is high. Operation of subways where groundwater is near the ground surface may require continuous de-watering to enable lower cost construction techniques to be used. Because eastern Queens uses ground water for supply, secondary growth in this area would impact upon the availability of water. None of the alternatives results in direct discharges of pollutants into groundwater and, therefore, there are no anticipated impacts upon groundwater quality.

5.4.2 Surface Waters

Impacts on surface waters from the Queens transit alternatives developed in this study are generatd by construction activities only. Indirect impacts from secondary development are judged to be insignificant because there is no significant stimulation of new development projected for any of the alternatives (see Section 5.1 Land Use and Socioeconomic Impacts).

Potential direct impacts on water quality may come from the following construction activities:

- <u>Subway Construction</u> - excavation associated with cut and cover construction may result in sediment laden stormwater and groundwater being discharged into the City's separate and combined stormwater sewers which ultimately discharge to surface waters.

- <u>Station Construction</u> - construction of new stations includes provision of bathroom facilities for patrons and employees adding new sewage flows to the City's sanitary sewer system. Reconstruction of existing stations may expand or improve sanitary facilities resulting in increased utilization.

- <u>Construction in an Existing Right-of-Way</u> - installation of new track or electrification of existing rails entails minor excavation work, thereby, contributing to erosion derived sediments that would be discharged with stormwater to the City's combined and separate sewer system.

- <u>Expansion of Right-of-Ways</u> - in adding a new track to an existing right-of-way, widening is required in certain locations. New fill embankments are required as well as new cuts and structural supports. These earth moving activities will result in sediment generation that will subsequently be discharged with stormwater to the City's surface waters.

The predominant effect of construction associated with the Queens Subway alternatives is erosion of disturbed soils, with subsequent sedimentation in the City combined and separate storm sewers and surface waters. These sediments impact water quality in two ways. First, the sediments carried to surface waters are generally the finer soil particles (silts and clays) that do not settle out of the water column. This results in increased turbidity, a characteristic of surface waters regulated in the State water quality standards. The second water quality effect associated with erosion is the potential for chemical pollutants in the soils to be released into the water column. This latter concern was examined by determining if any area in which excavation would occur has a history of toxic chemical storage, or dumping or if these areas might reasonably have been subject to unintentional chemical releases. The result of this investigation suggested that past use of diesel engines along the Montauk Line and in the Amtrak yards may have resulted in leakage of PCB containing transformer oils onto the track ballast. Since there is no available data concerning this or other possible chemical contaminants along the right-of-way, it is proposed that prior to design of the selected alternative, soil samples be analyzed for likely toxic constituents. If any significant quantities are found, proper disposal of these excavated materials (in accordance with Federal and State statutes regulating disposal of toxic material) will be arranged for, as part of the construction documents.

The degree of construction and thus the relative degree of impact for each alternative is summarized in Table 5-9. The greatest degree of impact

TABLE 5-9

CONSTRUCTION ACTIVITIES ASSOCIATED WITH ALTERNATIVES

	ALTERNATIVE				
Physical Modifications	No Additional Construction(1)	Queens Bypass Express	Queens Boulevard Line Local Connection	Subway/LIRR Montauk Transfer	Montauk/Archer Avenue Subway
Subway Construction	-Archer Avenue & Hillside Connector -63rd Street Line -Long Island City -Manhattan	-Yellowstone Blvd. Connection -Sunnyside Yards	-LIC - Northern Blvd. East @ 29th St. -Pedestrian Way	-Extension of 63rd St. Line to Thomson Avenue -Sunnyside Yards	-Extension of 63rd St. Line to Thomson Avenue -Sunnyside Yards
Station Construction * New Station + Expansion of Existing St.	-21st St. - LIC(*) -Jamaica-Van Wyck(*) -Sutphin Blvd(*) -Parsons Blvd(*)	-Northern Blvd.(*) -Woodside(+) -71st Continental(+)	None	-Thomson Avenue Transfer(*) -LIRR Stations (5) East of Jamaica Expanded(+) -Richmond Hill(+)	-Thomson Ave.(*) -Fresh Pond(+) -Woodhaven Blvd.(+)
Construction in Existing R.O.W.	None	-LIRR Main Line	None	-Electrification of Montauk Line of LIRR -Montauk Cutoff in LIC to Thomson Avenue Station	-Electrification of Montauk Line of LIRR -Montauk Cutoff LIC to Thomson Avenue Station
Expansion of R.O.W.	None	-Significant taking along route of LIRR Main Line	None	None	-Lefferts Blvd. Connection of Jamaica Ave. El to LIRR

(1) All of these physical modifications are common to all alternatives.

occurs from the Queens Bypass Express, as this alternative has extensive construction associated with expansion of the LIRR Main Line Right-of-Way to accommodate new tracks as well as subway connections at both ends of the LIRR Main Line.

Of particular concern with the Queens Bypass Express is the subway construction at Yellowstone Boulevard. The limited clearance available between structures requires a stacked tunnel arrangement. There is, however, a major combined sewer in the same area which would be incorporated into the stacked tunnels. During construction, there will be periods when the temporary sewer bypass will be subject to inflow from the construction site with its sediment laden runoff. There is also a risk of an extreme rainfall exceeding the capacity of the sewer bypass and discharging combined sewage onto the streets, similar to flooding that occurs in low lying areas of southern Brooklyn and Queens.

Among the build alternatives least construction occurs with the Queens Boulevard Line Local Connection which will connect the 63rd Street Tunnel with the local tracks of the Queens Boulevard Line. As part of this alternative, a pedestrian tunnel to the Ely Avenue Station of the IND line will be constructed in the Court Square area.

The two Montauk Line alternatives, the Subway/LIRR Montauk Transfer and the Montauk/Archer Avenue Subway, entail a similar amount of construction and, therefore, impact.

In all cases, the impact from sediment generated through construction will not be significant because of the small area of construction in the large drainage areas tributary to the City sewage treatment plants. Because the sewer systems of Queens are predominantly combined sewers, the stormwater runoff will already contain significant quantities of solids from the sewage, reducing the significance of sediment.

The most significant impact of sediment from construction is the potential to clog sewers resulting in local street flooding with combined sewage, a potential health hazard. To minimize this potential to the extent practical, it is proposed to utilize erosion controls wherever earth moving activities are required. Erosion controls, such as haybale filters for surface runoff, can reduce sediment discharge by up to 99 percent.

No impact is anticipated from sewage generation by new bathroom facilities at new or renovated stations because the MTA does not plan to add any restroom facilities, as a result of new construction.

Coastal Zone Management. The City of New York, under the New York State Coastal Zone Management Plan has developed a draft Waterfront Revitalization Program. This program identifies coastal areas of significance and outlines policies directed to achieve revitalization of the City's long neglected waterfront. The alternatives for transit in Queens by and large are not located in areas identified as waterfront areas. A section of the Subway/LIRR-Montauk Line, however, passes close to the Newtown Creek separating western Queens from Brooklyn and falls within the 100-year flood plain in this area. This approximately one mile section of track is located some 400 feet north of Newtown Creek separated from the creek by numerous industrial facilties, particularly bulk oil storage facilities.

The two alternatives that use the Montauk Line would require a grade separation for Greenpoint Avenue. This elevated ramp structure would be built within the 300 foot coastal zone area on land developed and used for commerce. Because this relocated road would not prevent the redevelopment of the waterfront, prevent public access to the waterfront, or effect fish and wildlife habitats, there appears to be no inconsistency with the New York City Waterfront Revitalization Program.

5.4.3 Groundwater

Construction of subways has a high potential to impact groundwater because of the need to dewater excavations to allow for construction. The construction associated with the alternatives for providing new transit to Queens includes subway construction in Long Island City for all of the alternatives, and at Yellowstone Boulevard for the Queens Bypass Express. All other construction is above grade or requires only limited short term dewatering which would not impact groundwater significantly.

The subway construction in Long Island City and Yellowstone Boulevard is located close to existing structures which could be damaged if extensive dewatering were accomplished. It has been determined that using construction methods which would maintain groundwater levels is preferable from economic and risk considerations. The result will be little dewatering associated with construction and, therefore, no significant impact upon groundwater quantities.

The second area that subway construction may impact groundwater is by dewatering for seepage control or structural reasons. Where groundwater levels are close to the ground surface, such as in western Queens, considerable savings can be achieved if groundwater levels can be permanently lowered. The analysis of structural needs for the subway construction concluded that permanent heavy structures are most suitable for this application. Therefore, there would be no permanent pumping of ground water associated with any of the alternatives to cause groundwater impacts.

5.5 Parklands

5.5.1 Introduction

A number of public parks are located within the area of potential impacts of the proposed alternatives. Assessments of potential impacts on these properties have been completed at the level of detail possible, given engineering information developed to date. These assessments are included in the following sections. Final assessments will be completed when the preferred alternative is selected and preliminary engineering information is available.

5.5.2 Applicable Regulations

In response to the requirements of Section 4(f) of the Department of Transportation Act, the potential impact area of the proposed improvements was surveyed and an inventory was prepared of all public parks and recreation areas to which the provisions of Section 4(f) might apply.

5.5.3 Probable Impacts on Parklands and Public Recreational Facilities

The evaluation of potential Section 4(f) effects on these properties involved an analysis of possible land taking or other use (decreased attractiveness or recreational value) in the process of constructing or operating one of the alternatives. In locations where the Long Island Rail Road trackbed already exists and the proposed new alignments are to be constructed within its existing right-of-way, no new land is required for rights-of-way along the alignments where parks are located. Generally, the potential for impacts on parks along the alignment in these areas would be related to noise level or visual quality changes, caused by the increased use of the existing right-of-way. To mitigate these impacts, suitable and aesthetically acceptable barriers would be provided, as necessary, as part of the project (See Figure 5-4 in Section 5.1). Increased use of the parks for recreation would not be a likely result of the project, as the proposed stations would not be located nearby. The following provides a more specific assessment of potential impacts.

Complete references for parks, herein referred to by number, are given in Table 3-16. Locations in relationship to the alignments are shown on Figure 3-13.

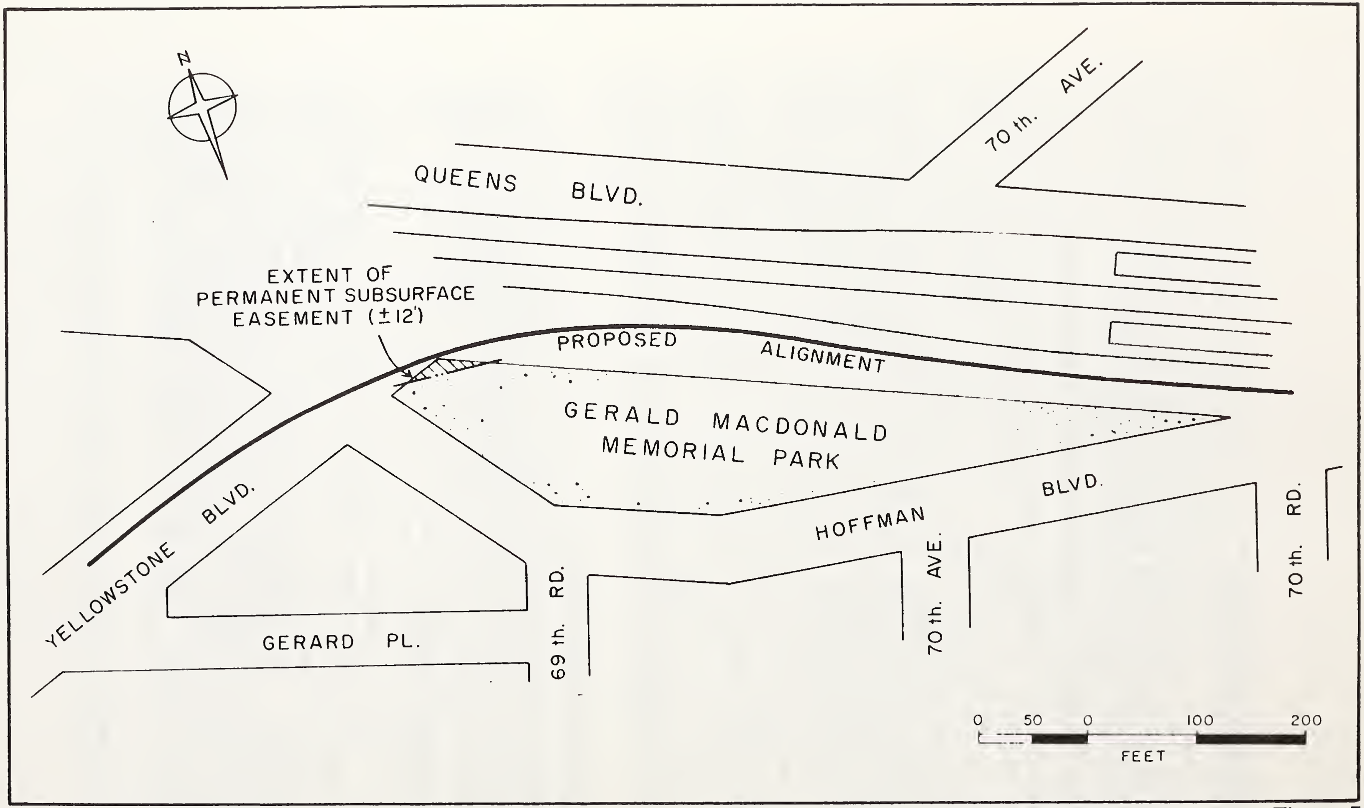
5.5.3(a) No Additional Construction

Parks identified as potentially impacted are Facilities 1, 18 and 19. However, any impacts of construction or operation associated with this alternative have occurred previously or were committed to, as part of the earlier program. No impacts beyond these will occur as part of the proposed program.

5.5.3(b) Queens Bypass Express

Parks identified as potentially impacted are Facilities 3, 4, 5, 6, 7, 8, 12 and 13. The Yellowstone Boulevard alignment essentially clears Facility 13, Gerald McDonald Memorial Park, but requires a permanent subsurface easement under a small portion of the parks for a tunnel underneath Yellowstone Boulevard. The affected park property is a narrow strip of parkland (12 feet in width) at the park's extreme west end. (See Figure 5-8). The effect of the cut-and-cover operations in the small part of the park will be to temporarily inconvenience park users during construction. Short term adverse effects will be increased noise and dust, and limited entry to the small portion of the park. This portion of the park will be completely restored at the end of construction.

Since Gerald MacDonald Memorial Park serves as a meeting place for many of the older residents living in the vicinity, its disruption, even if



GERALD MacDONALD
MEMORIAL PARK

Figure 5-8

temporary, may upset some of the users who have made a park visit an integral part of their daily routine. Howver, within the park's 700-foot length, there are many alternate seating locations which would be clear of the route's impact.

The Queens Bypass Express alignment also requires permanent use of a portion of park, Facility 5, also known by its Parks Department number of Q341C. (See Figure 5-9). This use involves acquisition of approximately .0354 acres of park property which includes 15 park benches, which could be relocated to other areas in the park. Most of the land that must be acquired for the route is undeveloped. Any trees which are affected may be replaced in kind upon the completion of construction.

The other parks listed above (Facilities 3, 4, 6 and 12) are in the general vicinity of the alignment but would not be affected by construction or operation of the alternative.

5.5.3(c) Queens Boulevard Line Local Connection

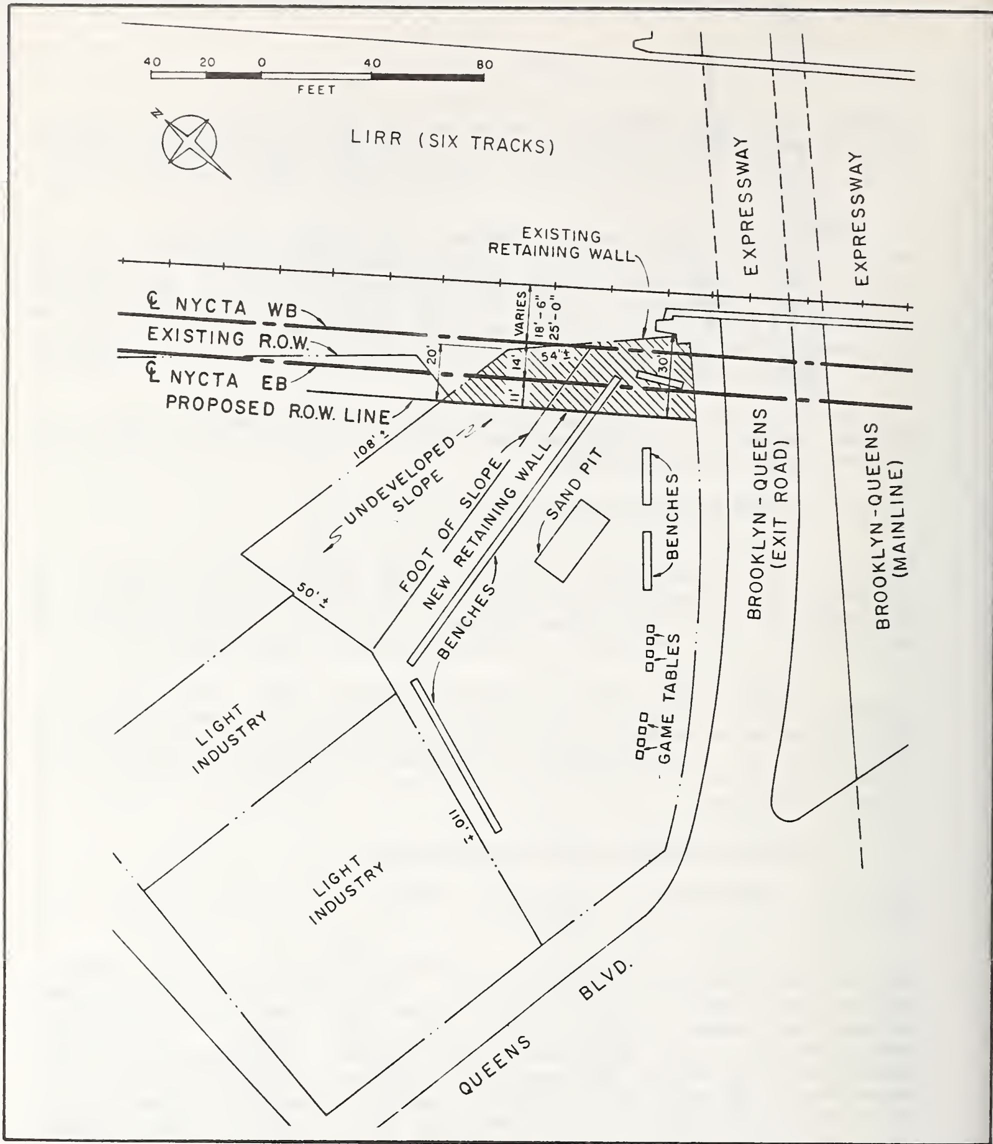
Parks identified as potentially impacted are Facilities 1 and 2. Facility 1 is the playground connected to Long Island City High School. As the playground is separated and buffered by 29th Street from construction of the subway at the Kinney System Parking Lot (located at Northern Boulevard and 40th Road), the playground would not be affected by the alternative.

Several small parks in the Court Square area (Facility 2) are actually traffic triangles containing few recreation facilities or amenities such as seating or landscaping. Construction in that area will be limited to the parking lot (Leckas Enterprises Parking Lot, Jackson Avenue and 45th Avenue) and no use of the parks is anticipated for construction or operation of this alternative.

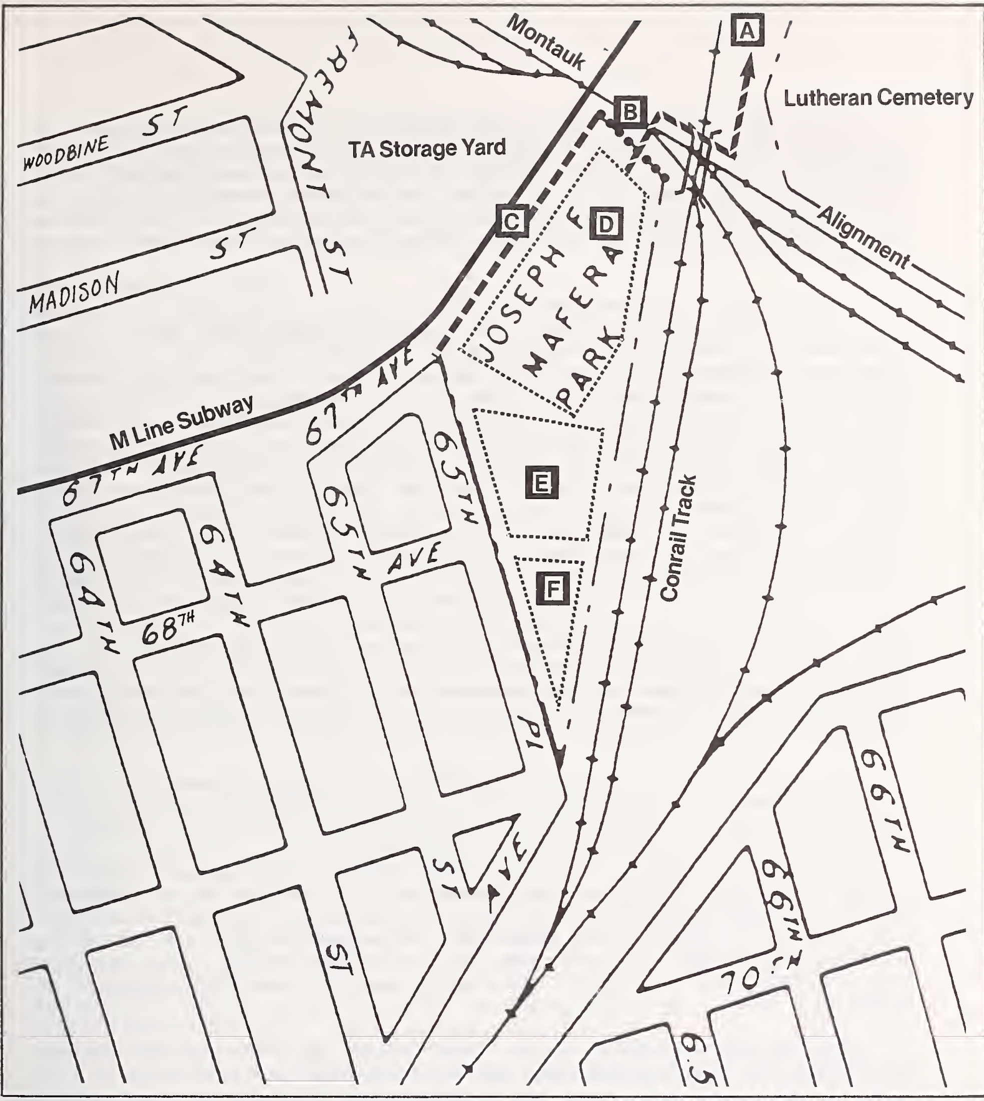
5.5.3(d) Subway/LIRR-Montauk Transfer Alternative

Parks identified as potentially impacted by this alternative are Facilities 9, 10, 11 and 14 through 31.

Joseph F. Mafera Park, Facility 9, is adjacent to the railroad alignment and one end is now open to the tracks. (See Figure 5-10). An unpaved informal path from the park crosses the railroad tracks and heads toward Metropolitan Avenue via Christ the King High School. A well-used baseball/football field is adjacent to the alignment. Implementation of this alternative will involve the construction of a chain link and barbed wire fence between the park and the tracks. Impacts on the park involve changes in visual quality related to the presence of the new fence, to the frequency of trains and to more intrusive noise impacts also related to the frequency of trains. Overall, safety conditions will be improved by the presence of a completely secure fence. Activities at the end of the park closest to the alignment are active recreational activities, which are themselves noisy and are not likely to be significantly impacted by the improvements.



SKETCH OF PARK WEST OF BROOKLYN-QUEENS EXPRESSWAY Figure 5-9



Legend

A Route of existing informal pedestrian crossing of Montauk alignment ; from Mafera Park to Christ the King High School next to the Lutheran Cemetery.

B End of Mafera Park which must be secured with fencing to prevent trespassing on Montauk line.

C Existing fence separating TA Storage Yard from the park

D Baseball/Football field

E Paved play areas

F Playground equipment for small children, seating areas

JOSEPH F. MAFERA PARK Figure 5-10

Ballfields at Woodhaven Boulevard, Facility 15, are also adjacent to the alignment with an existing chain link fence as a barrier. Impacts of this alternative on the ballfields involve changes in visual quality due to the frequency of trains passing by and due to the presence of the fence along the north end of the park and more intrusive noise impacts. The addition of a completely secure fence will improve safety conditions over those already existing.

The proposed alignment runs through Forest Park, Facility 16, passing along the existing right-of-way through an area of the park which is not developed with recreational facilities for intensive public use. The adjacent heavily wooded and steeply sloping land somewhat isolates the alignment from the more heavily used parts of the park and creates a noise barrier which will protect the park. A fence which is broken in many places separates the alignment from the park. The area of the trackbed is generally unkempt, with refuse collecting along it. Construction of the track may temporarily affect the quiet atmosphere of the park at the base of the slope where the alignment is located but will not affect park features. Park visitors should not be aware of it. Long term impacts from transit operations would be mostly operational noise, somewhat detracting from the natural setting in a limited area along the tracks at the base of the slope. Views of the alignment would be shielded by the densely wooded escarpment on either side of the alignment. To provide for the safety of park visitors a new, fully secure fence would be provided to separate the right-of-way from the park. Safety conditions in the park will be improved when the fence, which is broken in some places and now separates the alignment but does not prevent trespassers from crossing, is replaced with a fence which is completely secure.

Park Facility 23, a large area in Southeast Queens designated as a park, is also adjacent to the alignment. The park is presently not developed for recreational use and accordingly, no impacts of this alternative are likely.

Facility 32, Daniel A. Haggerty Park, a well developed park along the alignment will be affected by this alternative by additional noise. However, most recreational activities in the park are themselves noisy and take place in the context of the existing alignment. A new fence will be similar to the existing fence which is in good condition and which now separates the park from the Main Line. Little visual change and only small improvements in safety will occur.

Park facilities labeled 1, 10, 17-22, 24-31 and 33-34 are all several blocks from the alignment and would not be affected by this alternative.

5.5.3(e) Montauk/Archer Avenue Subway Connection Alternative

Impacts of this alternative on Facilities 9 through 11 and 14 through 19 are similar to those discussed above for the Subway/LIRR-Montauk Transfer alternative. However, the greater frequency of trains for this alternative may result in higher noise levels.

Facility 14 which is designated a park and which is actually a pedestrian ramp from a local street to Woodhaven Boulevard would be upgraded by a new ramp leading to the new Woodhaven Boulevard Station. Some visual quality change would occur in the vicinity of the ballfields due to the presence of the Woodhaven Boulevard Station. Increased traffic due to the station is not likely to significantly affect use of the ballfields.

5.6 Ecology Resources

5.6.1 Potentially Sensitive Areas

As indicated in Section 3.10, two of the Queens transit study corridors were identified as appropriate for consideration of potential significant impacts of project alternatives on ecology resources. One of these is the LIRR Main Line right-of-way where, under the Queens Bypass Express alternative, trackside areas could be affected by construction of additional tracks along the south side of the existing line. The second corridor area considered was the LIRR Montauk Line right-of-way. No expansion of the right-of-way is proposed under either the Montauk Transfer or the Montauk/Archer alternative but they would involve increased train traffic through Forest Park -- a 508-acre mature natural forest which represents an important New York City open space resource.

The survey of existing conditions reveal that none of the areas traversed contain wetlands. Further, the marginal areas along the LIRR Main Line (Queens Bypass) and that portion of the LIRR Montauk Line which lies west of Forest Park currently do not support significant wildlife populations or vegetation which would characterize them as ecologically sensitive areas.

5.6.2 Montauk Rail Line Within Forest Park

The primary area of concern in evaluating impacts on ecology resources is that segment of the LIRR Montauk Line which passes through Forest Park. The existing rail line traverses Forest Park for a distance of approximately one mile. As described in Section 3.10, this sector of the park constitutes a mature forest and a valuable natural resource within the City. The width of the railroad right-of-way within the Park varies from 60 to 70 feet. The railroad grade remains close to level, however the adjacent park areas vary in elevation from about 10 feet above to 20 feet below the railroad grade. Recreational use of the forest areas bordering the rail line is relatively light compared to other more developed sections of the park. These uses include walking trails and bridle paths. Other signs of human occupancy in this area of the park include fire sites and abundant debris ranging from broken glass to abandoned automobiles. The fence line along the railroad right-of-way is currently breached in several areas.

The principal wildlife population of Forest Park is made up of the bird species which are known to frequent the park (Section 3.10.3). Squirrels make up the principal terrestrial animal population. Though mice and cottontails can be found, human activity in the park, along with the lack of understory cover vegetation, limits habitation by larger varieties of forest floor dwelling species. Inquiry to the City Parks Department Flushing Meadow zoological staff yielded the opinion that because of human activity, lack of abundant ground-level food, available water and ground-level cover, the park would not support larger land species in addition to birds and tree-living animals such as squirrels and raccoons.

The vegetation of Forest Park is diverse and generally healthy. It is a mature forest dominated by species of oak and hickory. The trees reach heights of 60 to 90 feet and diameters ranging from 20 to 38 inches. It is the high crown cover formed by the taller trees which restricts penetration of sunlight and contributes to the lack of understory vegetation.

5.6.3 Impacts in the Project Study Areas

The two Queens transit alternatives which utilize the LIRR Montauk Line right-of-way -- Subway/LIRR-Montauk Transfer and Montauk/Archer Avenue Subway Connection -- both call for conversion from diesel powered trains to electrified service along the Montauk Line. Both alternatives provide for substantial increase in train volumes and frequency of service as described in Section 2.2. These alternatives would utilize the existing tracks and no expansion of the railroad right-of-way within the park is proposed.

The Montauk Line alternatives would not displace or significantly degrade existing wildlife habitats in Forest Park. The terrestrial and bird species within the park areas along the rail right-of-way are tolerant of urban activity and human disturbance. It can be expected that the species currently within the influence area of the rail line would adjust to proposed increases in train service and that impacts on wildlife would be negligible.

Construction in connection with improved trackwork and installation of security fences and noise barriers along the rail line would be confined to the existing rights-of-way. Only minor removal of vegetation would be required by this work. It is anticipated that if either of the Montauk Line options is selected as the preferred alternative, arrangements will be made with the City Parks Department for an ongoing program of inspection and maintenance of trees in the vicinity of the rail line. This program would provide safeguards against the improbable event of dead or weakened trees falling across the fenceline into the railroad right-of-way.

There would not be significant impacts on any known threatened or endangered species from implementation of any of the five Queens transit study alternatives. The surveys reveal that the marginal areas along most of the rail lines under study do not currently support substantial wildlife populations. In areas where parks, notably Forest Park, lie adjacent to the rights of way, there is a significant increase in the total population and diversity of species, especially hardy bird species. However, as indicated by investigations conducted under this study and consultation with the City Park Department, there is no evidence of significant non-urban terrestrial populations in the study corridors. In a regional context, the study corridors do not contribute significantly to the support of other than urbanized ecosystem inhabitants -- particularly in comparison to the number and diversity of species encountered in areas of similar size in rural locations in the region or in other locations in the City which provide more attractive wildlife habitats than Forest Park. In Queens these include Alley Pond Park and the Jamaica Bay Wildlife Refuge, both of which support substantial wildlife populations (primarily birds and aquatic or amphibious species) and are fully recognized as critical regional wildlife habitat.

5.7 Historic and Cultural Resources

5.7.1 Introduction

Since a number of buildings and places identified by the New York State Office of Parks, Recreation and Historic Preservation (Office of the State Historic Preservation Officer) and by the New York City Landmarks Commission (See Section 3.11) are within the area of potential impact of the alternatives, a review was conducted to determine if these buildings and places would be subject to any impacts of project implementation. This review included consultation with the New York City Landmarks Preservation Commission, the New York State Office of Parks, Recreation and Historic Preservation and a number of local groups involved in historic preservation in the project area.

Assessments of potential impacts on these properties were completed at the level of detail possible given engineering information developed to date, and it has been preliminarily determined that the proposed improvements would have no adverse impacts on historic properties.

These assessments are included in the following sections. Final assessments will be completed when the preferred alternative is selected and preliminary engineering information is available. This decision has been coordinated with representatives of the New York State Office of Parks, Recreation and Historic Preservation and with the New York City Landmarks Preservation Commission. (Refer to Technical Supplement for copies of correspondence with these agencies.) Regarding archaeological sites, since there exists no predictive model of archaeological sites in Queens, it is difficult to ascertain at this point any significant impacts of construction which involve subsurface disruption.

In discussions with representatives of the New York State Office of Parks, Recreation and Historic Preservation and the New York City Landmarks Preservation Commission, it was agreed that during this phase of the analysis, when several alternatives are still under consideration, the environmental study would consist primarily of review of a sensitive archaeological areas map. This map is current and is available at the State Office of Parks, Recreation and Historic Preservation. In subsequent study phases, when a preferred alternative is selected, detailed archaeological investigation of the alignment will be carried out as required.

5.7.2 Probable Impacts On Historic Properties

The area of potential impact on historic properties includes the area within one thousand feet on either side of the alignment where there will be new construction. Construction includes electrification, fencing, and other improvements to the existing Montauk Line, as well as underground construction and station facilities. The area of potential impact does not include alignments where service changes would occur in existing subway tunnels.

Complete references for historic sites, herein referred to by number, are given in Table 3-19. Locations in relationship to the alternatives are shown on Figure 3-14.

5.7.2 (a) No Additional Construction

Historic properties identified as potentially impacted are Property 3 in Long Island City and Properties 12 through 19, which are all located in downtown Jamaica. However, any impacts of construction or operation associated with this alternative have occurred previously or were commited to as part of the earlier construction program. No impacts beyond these will occur as part of the proposed program.

5.7.2 (b) Queens Bypass Express

Historic properties in the area of potential impact are Property 2, New York and Queens County Warehouse, Property 4, the Returned Soldier Monument, and Property 8, Engine Company 292. The warehouse is separated and buffered from any construction or operation on the Main Line by several blocks of industrial uses and by the AMTRAK/Conrail New York Connecting Railroad. The Returned Soldier Monument is three city blocks from the Main Line, and the fire station is approximately three blocks from the Main Line. None of these three properties would be affected in any way by construction or operation of this alternative.

5.7.2 (c) Queens Boulevard Line Local Connection

Historic properties in the area of potential impact are Properties 6 and 5. Property 6, the Hunters Point Historic District, is separated and buffered from construction at Court Square by several blocks. Similarly, Property 5, the New York State Supreme Court Building, is buffered by Jackson Avenue from the parking lot at Jackson Avenue and 45th Avenue.

5.7.2 (d) Subway/LIRR-Montauk Transfer Alternative

Historic properties in the area of potential impact are Property 9, Fresh Pond - Traffic Historic District, Property 10, Engine Company 291, Property 11, the Ralph Bunche House, Property 12, the LIRR Roundhouse Complex, Property 1, the West Chemical Products building and the buildings listed under Property 7 in Table 3-19. The first, which is part of the Ridgewood Multiple Resource Area, is separated and buffered from the alignment by Traffic Avenue and a block of industrial uses. The potential for impacts on the Fresh Pond - Traffic Historic District has been coordi nated with the Greater Ridgewood Restoration Corporation which has concluded that the project could "only have a positive impact on the Ridgewood Community and historic areas" (See June 13, 1983 letter included in the Technical Supplement).

Property 10, Engine Company 291, is separated from the Main Line by two city blocks, and Property 11, the Ralph Bunche House, is four blocks from the Main Line.

Property 12, the Long Island Rail Road Roundhouse Complex, is located within the Atlantic Division/Montauk Division Long Island Railroad Yards west of the Van Wyck Expressway and north of 120th Street and Atlantic Avenue. With respect to these buildings, reconstruction of the alignment through the yards will only intensify existing railroad related activities which are compatible with the industrial character and railroad use of the building. Property 1, the West Chemical Products, Inc., is adjacent to new construction for the pedestrian underpass associated with this alternative. If it is determined that this 1890's brick factory building is noteworthy as a landmark (to date identified by a 1974 National Park Service Survey only), then foundation monitoring and appropriate protection measures would be taken during construction. In this area, below grade construction would be approximately ten feet below existing building foundations. Once construction is complete, operation of the underground passageway would cause no impact on the building. The assessment conducted at this stage of the analysis therefore concludes that the Transfer alternative would cause no impacts on historic properties. The Property 7 buildings are separated from the new Thomson Transfer Station in Sunnyside Yards by Thomson and Skillman Avenues.

The assessment conducted at this stage of the analysis, therefore, concludes that the Transfer alternative would cause no impacts on historic properties.

5.7.2 (e) Montauk/Archer Avenue Subway Alternative

Impacts of this alternative on historic properties are similar to those of the Montauk Transfer alternative.

5.8 Energy

5.8.1 Summary of Methods and Assumptions

The dominant form of energy consumed by operation of the transit services in this study is electricity, measured in kilowatt-hours. All revenue Transit Authority trains are powered by direct current, as are the electrified trains of the Long Islang Rail Road. The electricity is generated externally by Consolidated Edison, the Power Authority of the State of New York and the Long Island Lighting Company in alternating current and converted to direct current using trackside converters.

Electricity consumption is dependent upon a number of transit factors, including the trains' top speeds, frequency of station stops, acceleration and braking rates, the effectiveness of third rail insulation of electricity is most directly related to the car-mile, the movement of one transit car for one mile. On a system-wide basis, the TA averages 6.88 kilowatt-hours per car-mile. The LIRR averages 6.80 kilowatt-hours per car-mile in New York City and slightly more east of the city line. Station stops in Nassau and Suffolk Counties are more frequent than in New York and the additional accelerations consume more electricity on a car-mile basis. The New York City rate of consumption is used in this analysis for LIRR Queens-oriented service.

Approximately 80.5 percent of the LIRR electric consumption is variable, dependent upon car mileage. The remainder is fixed electric consumption, primarily leakage of current from the energized third rail. The variable-fixed ratio was determined in 1972, when a six-week strike, encompassing a full electric billing period, kept virtually all trains off the railroad. The variable-fixed ratio cannot be determined for Transit Authority operations, although the ratio is likely to be very similar. Because all Queens alternatives include additional electrified trackage where some leakage will surely occur, energy calculations are based on a total of the fixed and variable electric consumption.

Some Queens transit operations consume energy in the form of diesel fuel rather than electricity. Included are buses operated by the TA, MSBA, private companies and LIRR Montauk Branch diesel passenger trains, which will be discontinued in two of the alternatives. It was assumed that all buses in the study, regardless of operator, consume fuel at the TA average of 4.5 miles per gallon.

The LIRR diesel trains consume 0.007068 gallons of fuel per gross ton-mile traveled. Locomotives and power units weigh an average of 135 tons each, while diesel-hauled passenger cars weigh 55 tons each. Thus, the three Montauk Branch passenger trains weigh an average of 618.3 tons and consume nearly 4.37 gallons of diesel fuel for each mile traveled.

Because electricity is the dominant form of energy used by transit services in Queens, it is desirable, for comparative purposes, to calculate all energy consumption changes in kilowatt-hours. A gallon of number 2 diesel fuel embodies the energy of 39.6 kilowatt-hours, assuming a typical diesel fuel energy content of 135,000 Btu per gallon.

5.8.2 Operating Energy Expenditures and Savings

Table 5-10 displays the 1983 calibration and incremental annual energy consumptions of the five Queens alternatives. Calibration and incremental energy consumptions are shown for the four modes of transit affected by the alternatives: subway, bus, LIRR electric trains and LIRR diesel trains.

Except for the Montauk Transfer alternative, Transit Authority subway operations represent the largest change in energy consumption for each alternative. In the Transfer alternative, LIRR electric train operations represent the largest change.

The Montauk Transfer transit operations result in the largest Queens energy consumption change, 72.79 million kilowatt-hours. This represents slightly less than a two-percent increase over system-wide Transit Authority and LIRR usage.

TABLE 5-10

ANNUAL ENERGY CONSUMPTION
(IN MILLIONS OF KILOWATT-HOURS)

Alternative	Calibration 1983	No Additional Construction	Queens Bypass Express	Queens Blvd. Line Local Connection	Montauk Transfer	Montauk/ Archer
TA Subway[1]	1,834.25	22.21	61.39	34.99	27.09	59.33
TBA Bus[2]	1,253.51	0.54	0.54	0.54	6.00	2.27
LIRR Electric Cars[3]	317.59	0.00	0.00	0.00	40.09	0.00
LIRR Diesel Trains[4]	412.27	0.00	0.00	0.00	-0.39	-0.39
Total	3,817.62	22.75	61.93	35.53	72.79	61.21

[1] Assumes 6.88 kWh per subway car-mile.

[1] Equivalent energy units assuming 4.5 miles per gallon, 135,000 Btu per gallon of diesel fuel and 3413 Btu per kWh.

[3] Assumes 6.80 kWh per car-mile in New York City.

[4] Based on 0.007068 gallons per gross train ton-mile. Equivalent energy units assume 135,000 Btu per gallon of diesel fuel and 3413 Btu per kWh.

Another important aspect of energy differences among the alternatives is the incremental peak electric generating capacity required for each alternative.

Table 5-11 displays the requisite capacity based on a LIRR finding that 695 kilowatts are required for each car in revenue service on the railroad during the morning peak period. Because LIRR and TA energy consumption rates per car-mile are similar, the instantaneous generating capacity has been applied to TA operations as well. The Bypass Express alternative requires the largest additional generating capacity, 215,000 kilowatts. This is equivalent to about 36 percent of a modern 600 MW oal or oil-fired power plant.

5.8.3 Construction Energy

The energy impact of construction is based on the amount of construction material required and the energy required to process and transport these materials. For each of the build alternatives, quantities of building materials have been estimated and tabulated on Table 5-12. The quantities are multiplied by a value for "embodied energy" which is different for each type of material. Embodied energy, measured in BTU's (British Thermal Units) is the total amount of energy required for the production of a material, including the extraction of raw materials, processing and transportation to the job site.

TABLE 5-11

REQUIRED ELECTRIC GENERATING CAPACITY INCREASES[1]

Alternative	Calibration 1983	No Additional Construction	Queens Express Express	Queens Blvd. Line Local Connection	Montauk Transfer	Montauk/ Archer
TA Cars in in Service	4926	72	310	190	110	259
LIRR Cars in Service	674	0	0	0	88	0
TA Electric Generating Capacity (millions of kilowatts)	3.42	0.05	0.22	0.13	0.08	0.18
LIRR Electric Generating Capacity (millions of kilowatts)	0.47	0	0	0	0.06	0
Total (millions of kilowatts)	3.89	0.05	0.22	0.13	0.14	0.18

[1] Assumes 695 kilowatts of electric generating capacity are required for each transit car in revenue service.

TABLE 5-12

CONSTRUCTION ENERGY CONSUMPTION

	Unit	BTU Per Unit	Queens Bypass Express		Local Connection		Montauk Transfer		Montauk/Archer	
			Quantity	BTU Total	Quantity	BTU Total	Quantity	BTU Total	Quantity	BTU Total
Steel										
a) Shapes	TON	$3.7x10^7$	18,000	$6.7x10^{11}$	3,300	$1.2x10^{11}$	4,200	$1.6x10^{11}$	4,300	$1.6x10^{11}$
b) Rails	TON	$5.4x10^7$	13,000	$7.0x10^{11}$	525	$0.3x10^{11}$	17,000	$9.2x10^{11}$	19,000	$10.26x10^{11}$
Concrete	CY	$2.6x10^6$	160,000	$4.2x10^{11}$	23,000	$0.6x10^{11}$	81,000	$2.1x10^{11}$	78,000	$2.0x10^{11}$
Lumber (Ties)	MBF	$9.6x10^6$	2,200	$0.21x10^{11}$	0	0.0	2,800	$0.3x10^{11}$	3,300	$0.32x10^{11}$
Stone (Ballast)	CY	$1.3x10^5$	69,000	$0.09x10^{11}$	0	0.0	90,000	$0.12x10^{11}$	105,000	$0.14x10^{11}$
TOTAL				$18.2x10^{11}$		$2.1x10^{11}$		$13.32x10^{11}$		$14.32x10^{11}$

6.0 EVALUATION

6.1 Introduction and Background

The Queens subway options are aimed at relieving overcrowding on the Queens Boulevard subway line, maximizing the use of newly constructed facilities, and providing expanded rail transit service in the borough and to Manhattan via the new 63rd Street Tunnel. The current analyses have built on the work of previous study phases, phases that developed and evaluated 18 alternatives, settling on five for further detailed examination. From the start, the program recognized the need for systematic screening and evaluation of candidate alternatives and, accordingly, developed early a set of goals, objectives and criteria for evaluation. These were applied, as appropriate, to candidate alternatives under increasing detail, and succeeded in supporting the elimination of all but the five options examined in this DEIS.

The basic goals and objectives that were set out originally stand well, with only minor modifications for evaluating the five Queens Subway Options. However, the corresponding criteria and measures, described in Working Paper Number 17, have been focused for this evaluation in three perspectives: (1) effectiveness—the degree to which each of the options fulfilled the project's three major transportation goals; (2) efficiency—the dollar cost versus option effectiveness; and (3) equity—the fairness in distribution of costs and benefits. This last perspective examines the area-specific negative effects of each option (including environmental impact) against the area-specific improvements offered, to judge equity, i.e., who benefits, who pays. Finally, the Queens Subway Options are assessed against the context of capital funding sources, operating revenues, and system-wide operational deficit, and the institutional forces that affect implementability.

Because the purpose of the evaluation is to provide decision-makers with the information to choose a preferred alternative, the evaluation has rested on five basic assumptions: (1) that each option be examined completely and to the same level of detail; (2) that the same goals, objectives and criteria be applied to each option; (3) that an option be distinguished from another with regard to a given criterion, only when the difference is significant; (4) that the similarities and differences among options and their significance be clear to the decision-makers and the public, most of whom are not transportation engineers or planners; and (5) that the evaluation process itself not weigh criteria, rank alternatives overall (although they are ranked for performance in meeting individual criteria), or conduct trade-off analyses among competing goals and objectives -- these decision-making steps will be undertaken by the MTA's Board of Directors, in choosing the locally preferred alternative, and by UMTA, as appropriate, in consideration of future funding.

6.2 Effectiveness

In evaluating the Queens Subway Options, the first test is of their effectiveness in meeting the project's three transportation goals: (1) to relieve overcrowding on the E and F lines; (2) to best utilize existing capacity in the Queens corridor; and (3) to improve transportation service in the corridors. The transportation measures described in Working Paper Number 17 are grouped in the discussions below to evaluate the options in terms of each goal.

6.2.1 Relief of Overcrowding on the E and F Lines

Overcrowding on the E and F lines is severe, and the future without one of the build options offers no relief. The measures of overcrowding and the comparative ability of the build options to alleviate the situation are key to the effectiveness evaluation. The four primary performance measures are: reduction in the increment of annual ridership that is over a target capacity; diversion of annual ridership from the E and F lines; reduction in passenger miles spent in uncomfortable conditions; and reduction in volume-to-capacity ratio per car on the E and F lines in the peak hour of the day.

6.2.1(a) Reduction in Increment of Annual Ridership That is Over Target Capacity

UMTA has recommended a reasonable peak hour condition as 2.7 square feet for each standing passenger. It corresponds to a crowded condition, where all seats are filled, and the remaining riders must stand close to one another, but space is ample enough to get on and off the train without undue interference. For the 75 foot cars on the E and F line, this area allotment would allow 195 passengers per car.

In the case of No Additional Construction, for instance, with the E and F lines each averaging 13 eight car trains in the peak hour, the excess above the UMTA recommended capacity would be 18,350 passengers in the AM peak hour—13,600 on the F train and 4,690 on the E. The condition would occur in the PM as well as AM and extend into the hours just before and after the peak. On an annual basis, this would translate to 12.7 million passengers (measured at the 53rd Street Tunnel), representing 12 percent of the projected annual ridership of 107.1 million.

Each of the four build options would improve the situation substantially. All would completely eliminate average peak ridership of over 195 passengers per car on the E line, and the F line would fare better as well.

As seen on Table 6-1, the Queens Bypass Express, under the currently proposed operating schedule of 10 trains per peak hour on the F line, would reduce the annual increment over the UMTA recommended capacity to 1.5 million. In fact, it would be possible under this option to add F trains and completely eliminate any overcrowding, with no sbustantial increase in operating costs.

The Local Connection, with 30 E and F trains per peak hour, would perform nearly as well, reducing the increment to 2.1 million. Montauk/Archer (also 30 E and F trains per peak hour) would bring the increment to 3.5 million and Montauk Transfer would lower it to 5.1 million.

6.2.1(b) Diversion of Annual Ridership from the E and F Lines

The relief of overcrowding is a direct result of diversion of E and F train riders to the new options. As seen on Table 6-1, the Queens Bypass Express

TABLE 6-1

EFFECTIVENESS OF OPTIONS IN RELIEVING OVERCROWDING ON THE E AND F LINES

	No Additional Construction	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Number of E & F riders over Target Capacity (millions/year)	12.7	2.1	1.5	5.1	3.5
Net reduction in E & F riders over Target Capacity (millions/year)	--	10.6	11.2	7.6	9.2
Diversion from E & F line at:					
53rd St. Tunnel	--	18.2	48.5	9.6	14.4
Queens Plaza	--	21.1	48.5	9.6	14.5
Roosevelt Ave.	--	14.7	54.5	12.0	13.8
71-Continental (millions/year)	--	(0.2)	49.5	12.2	11.3
E/F passenger miles travelled above:					
Comfort Level	282	253	64	234	228
Target Capacity	197	132	42	76	71
Practical Capacity (millions/year)	76	54	5	67	64
Reduction in E/F passenger miles above target capacity (millions/year)	--	65	155	121	133
Volume/Capacity ratios in peak hour at 53rd Street Tunnel	1.28	0.93	0.91	1.02	0.97

option would succeed in diverting passengers from the E and F lines at least twice as well as any other alternative. This option would divert nearly 70 percent of the riders currently boarding the E and/or F train at or east of the 71-Continental station. The direct, rapid service through Queens would make this option extremely attractive to these subway riders. Once they arrive at Queens Plaza, it is anticipated that about ten percent of diverted passengers would transfer back to the E or F train, because of convenience in reaching Manhattan stations. Thus, diversion of E/F riders from the 53rd Street Tunnel under this option would be about 48.5 million a year, about 45 percent of the ridership expected with the No Additional Construction option. The magnitude of diversion would be enough to allow NYCTA to substantially reduce the number of cars assigned to the E and F lines (240 in 30 trains to 160 in 20 trains for the peak hour).

Both the Local Connection and Montauk/Archer options would perform similarly in this measure, except at 71-Continental. There the diversion effect of the Montauk/Archer option, which runs along a completely different route from the Queens Boulevard line, would already be felt. But the Local Connection, which makes use of the local tracks on the Queens Boulevard line -- tracks that are still shared by the express trains at 71-Continental -- would have the effect of adding a few riders. Substantial diversion to the Local Connection would take effect by Roosevelt Avenue and reach its peak at Queens Plaza. Neither the Local Connection nor Montauk/Archer would divert enough passengers to permit the NYCTA to decrease the number of cars serving the E and F lines.

The Montauk Transfer would divert 9.6 million annual passengers from the 53rd Street tunnel, faring less well than the other three build options and paralleling its performance in reducing ridership over target capacity. However, this option, like Montauk/Archer, would divert substantial ridership at 71-Continental and Roosevelt Avenue, performing as well or better than the Local Connection in these locations.

6.2.1(c) Reduction in "Uncomfortable" Annual Passenger Miles Traveled on the E and F Lines

The variation in location of ridership diverted is reflected in passenger miles traveled in uncomfortable conditions—a measure of both overcrowding and its duration. For this measure, three "comfort" conditions were chosen:

(1) A comfort level of 150 passengers for the E and F lines' 75-foot subway cars: this defines a situation where all seats are taken and there are a number of standees; however, there would be enough room, for instance, to walk through the car without encountering excessive conflict.

(2) The UMTA-recommended capacity of 195 passengers per 75-foot subway car: describes a "reasonable" level of rush-hour crowding (see 6.3.1 (a) above for further discussion).

(3) Practical capacity, used by NYCTA and MTA, of 220 passengers for a 75-foot subway car: used as a planning maximum, this is a fairly crowded condition, with all seats taken and about 2.5 square feet per standee; passengers would be forced to stand close together, in many cases

touching. Practical capacity is not ideal from a comfort point of view; however, it is better than conditions today on the E and F lines, where crush loads force people to squeeze together, with little opportunity to move, and make it extremely difficult, sometimes impossible, to get on or off the train.

As seen on Table 6-1, the Queens Bypass Express would be most effective in reducing passenger miles traveled above both UMTA-recommended and practical capacities—a net reduction of 155 million and 71 million passenger miles, respectively. Compared with No Additional Construction, this represents a 79 percent reduction of passenger miles traveled above UMTA-recommended capacity and a 93 percent reduction of passenger miles over practical capacity.

Performance of the remaining three build options would vary because of differences in location of diversion from the E and F lines. Montauk Transfer and Montauk/Archer both would perform substantially better than Local Connection in reducing passenger miles traveled above target capacity (121 and 133 million passenger miles reduced compared to 65 million). Because most of the Montauk options' ridership diversion would take place at or east of Roosevelt Avenue, overcrowding would be greatly reduced for a long segment of the Queens-Manhattan trip. This would not be the case for Local Connection, whose greatest diversion would be at and west of Roosevelt Avenue. However, at and west of Queens Plaza—which is the most crowded end of the line overall—the greater diversion to Local Connection would make that option more effective than Montauk Transfer or Montauk/Archer in reducing passenger miles traveled in very crowded condition (above practical capacity).

6.2.1(d) Reduction in Peak Hour Volume-to-Capacity Ratios on the E and F Lines

A traditional method of estimating overcrowding is the volume-to-capacity ratio—a measure of the balance between demand (volume of passengers) and supply (operational capacity). For this evaluation, capacity is computed by multiplying the number of subway cars per hour by 220, the practical car capacity. For No Additional Construction, 13 eight-car trains each were assumed for the E and F lines—this being the current average of peak hour through-put. Local Connection and the two Montauk options would operate to their schedule of 15 eight-car trains each on the E and F lines. The number of peak hour trains would be lower under the Queens Bypass Express option—10 eight-car trains on each line—because the volume of passengers will have been decreased. As seen on Table 6-1, all options would greatly reduce V/C ratios on the E and F trains from No Additional Construction. The Local Connection and Queens Bypass Express options would be more effective than the two Montauk options in reducing the V/C ratios, with the greatest reduction achieved by the Queens Bypass Express. While Montauk/Archer is not as effective as Local Connection or Queens Bypass Express, V/C ratios would still be lowered to below 1.0. Although V/C ratios under Montauk Transfer would be below No Additional construction, it is the only build option where the ratio would remain above 1.0.

6.2.2 Utilization of Existing Capacity in the Queens Corridor

The Queens corridor is currently served by a number of subway lines utilizing three tunnels to Manhattan. Within the next few years, additional facilities will open: the 63rd Street tunnel, the Archer Avenue subway, and the Hillside connector (see section 2.2.1 for full description). Clearly, balanced utilization of all facilities is desirable. More important, the new facilities represent recent investments and costs, and they are transportation resources that could bring benefits to Queens corridor residents and workers. However, as currently configured, the 63rd Street tunnel would serve only one Queens station —in Long Island City at 21st Street—thus leaving most of its capacity from Queens unused. Measures of effectiveness in meeting the utilization goal are: annual ridership in the 63rd Street tunnel and on the Archer Avenue subway and Hillside Connector; total capital costs (including sunk costs) per annual passengers in the 63rd Street tunnel; timeliness, i.e., the earliest point at which use of the tunnel could begin; and comparison of peak-hour passenger volumes to tunnel capacity at all four subway tunnels.

6.2.2(a) Annual Ridership in the 63rd Street Tunnel and on Archer Avenue and Hillside Connector

As seen on Table 6-2, Queens Bypass Express would be most effective in utilizing the 63rd Street tunnel, carrying 58.5 million passengers through the tunnel annually—nearly twice the next highest option. Montauk/Archer with 31.0 million, would be second in performance. However, while the ridership would be similar to the Local Connection's 26.4 million, more trains would be required on the Montauk/Archer to maintain attractive headways and routes in Manhattan so that operating costs would be higher. The fact that Montauk/Archer's projected ridership in the 63rd Street Tunnel would be higher than the Local Connection (their positions were reversed for the E/F diversion measure in 6.2.1 (b)), indicates that the Montauk/Archer option would divert more of its passengers from lines other than the E and F.

The Montauk Transfer would perform less well than the three other "build" options with an estimated 16.3 million annual riders. However, it would bring substantially more riders through the tunnel than would the No Additional Construction option, which would attract virtually no riders (0.35 million annually) east of Roosevelt Island. (Roosevelt Island, planned on the basis of future subway availability, would generate moderate ridership on the 63rd Street line.)

In terms of use of the other soon-to-be-completed facilities, the options would have little effect. Queens Bypass would make the best use of Archer Avenue and Hillside Connector, but the other options would closely approach this usage too. The one exception is Montauk/Archer which would divert passengers from the Hillside Connector by providing better service.

6.2.2(b) Total Capital Costs (Including "Sunk" Costs) per Annual Passengers in the 63rd Street Tunnel

As described in Section 2.2.1, when complete, the 63rd Street tunnel will have cost $795 million to build; it will generate 352,000 annual passengers—a per passenger cost of $2,258.50 (See Table 6-2). The total current dollar value of capital costs for each option are $360 million for the Local Connection, $1,900 million for the Queens Bypass, $870 million for the Montauk Transfer, and $1,170 for Montauk/Archer. The capital costs of a given option would be added to the investment already spent, but the option would increase use of the tunnel,

TABLE 6-2

EFFECTIVENESS OF OPTIONS IN UTILIZING EXISTING CAPACITY IN QUEENS CORRIDOR

	No Additional Construction	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Annual Ridership:					
63rd St. Tunnel	0.35	26.4	58.5	16.3	31.0
Archer Avenue	18.0	18.0	18.1	13.7	17.1
Hillside Conn.	14.8	14.8	16.6	11.1	0.8
(millions/year)					
Total Capital Costs per Annual Passenger in 63rd Street Tunnel	$2,258.50	$ 43.75	$ 46.10	$102.15	$ 63.40
Construction Completion	1986	1993	1998	1995	1997
Percentage of Peak Hour Tunnel Capacity Utilized					
63rd Street Tunnel	0.4	31.2	69.3	19.7	36.8
60th Street Tunnel	78.8	66.6	68.1	75.7	72.5
53rd Street Tunnel	111.6	92.6	61.0	101.6	96.5
42nd Street Tunnel	75.5	75.4	72.7	75.6	73.4

thus decreasing capital cost per passenger. As seen on Table 6-2, that reduction would be dramatic—orders of magnitude lower—with Local Connection and Queens Bypass at $43.75/passenger and $46.10/passenger, respectively, Montauk/Archer at $63.40, and Montauk Transfer at $102.15.

6.2.2(c) Timeliness

From the point of view of utilization, it is preferable that the 63rd Street tunnel be better utilized as quickly as possible. As shown on Table 6-2, Local Connection, which could be complete by January 1993 would be more effective than the other options and Queens Bypass Express, with completion in 1998, the least effective.

6.2.2(d) Peak Hour Utilization of the Four Subway Tunnels

This measure indicates the extent to which an option would make effective use of the existing system in bringing riders from Queens to Manhattan. It is defined by examining the percent usage of maximum capacity of each of the Queens tunnels -- 63rd Street, 60th Street (BMT), 53rd Street, 42nd Street (IRT #7 trains) -- under each option (This capacity is calculated by multiplying the maximum number of subway cars that could be scheduled through the tunnel, by the practical capacity of each car.)

Of the five options, the Queens Bypass Express would create the most even spread of system utilization, with a range of 61.0 to 72.7 percent of capacity in the four tunnels. No Additional Construction would result in the most skewed usage, from 0.4 percent in the 63rd Street tunnel east of Roosevelt Island to 111.6 percent in the 53rd Street tunnel. In between, the Local Connection and Montauk/Archer schemes would perform similarly (31.2 and 36.8 percent in the 63rd Street tunnel, respectively, to 92.6 and 96.5 percent in the 53rd Street tunnel, respectively). The Montauk/Transfer option, while performing measurably better than No Additional Construction, would not fare as well as the other build options. The 63rd Street tunnel would still be very underutilized (19.7 percent), while the 53rd Street tunnel would still operate at above practical capacity (101.6 percent).

6.2.3 Improve Transportation Service in the Queens Corridor

Transportation service can be improved in several ways: by reducing travel time, by providing subway service to areas currently without direct access; by increasing the number of passenger miles traveled in comfortable conditions; by improving access to the handicapped; by creating a sense of user personal security; by offering flexibility in choice of routes; and by creating an operating scheme that is flexible and reliable in the face of problems and other unusual conditions. In addition, two other aspects of the subway options affect transportation service: the ability to maintain service during construction and the capability of the transportation system to accommodate future plans for physical extension or increase in service. These measures of service are examined for each option below.

6.2.3(a) Travel Time

Travel time, one of the basic measures of transportation service, is measured systemwide as total annual passenger minutes saved. As seen in Table 6-3, Montauk/Archer and the Queens Bypass Express would yield the greatest annual time savings of 637.8 and 610.4 million passenger minutes, respectively. Local Connection would save 433.2 million passenger minutes—about two-thirds that of the higher performance options—and Montauk Transfer would do least well, with 236.8 million passenger minutes saved. It should be noted that all four options offer substantial corridor-wide annual savings. Those options that perform best do so because they attract a greater number of riders and generate a larger per-trip time savings.

6.2.3(b) Accessibility

This criterion of service is measured simply as the number of people who would be able to walk to a subway station. In the year 2000 an estimated 1.14 million people in Queens will have walk access to a subway station. This includes those who would be able to walk to existing stations and those within walking distance of the new Sutphin-Archer, Parsons-Archer and Roosevelt Island stations. (Walking distance is measured as 0.8 miles; this is the point at which half those who live/work within that distance would choose to walk. This estimate is based on analyses of several studies of walk habits calibrated for Queens.) As seen on Table 6-3, only two build options would offer new direct access to the system, Montauk Transfer and Montauk/Archer.

TABLE 6-3

EFFECTIVENESS OF OPTIONS IN IMPROVING TRANSPORTATION SERVICE IN THE QUEENS CORRIDOR

	No Additional Construction	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Passenger Minutes Saved/Year (millions)	--	433.2	610.4	236.8	637.8
Residents with New Access	11,300	11,300	11,300	143,400	28,500
Passenger Miles in Queens Corridor traveled at or above:					
Comfort Level	429.4	420.8	335.8	370.0	364.9
Target Capacity	208.6	143.4	104.9	87.3	82.8
Practical Capacity (millions/year)	76.0	54.1	4.8	67.4	63.5
Reduction in passenger miles traveled at or above target capacity (millions/year)	--	65.2	103.7	121.3	125.8
New Access for Handicapped	Archer Ave. line Hillside Conn. 21 St, Roosevelt Island, 63rd/Lex.	Same as NAC; allows Archer Ave./ Hillside entries option to reach 21st, Roos. I., 63rd/Lex.	Same as LC plus 71-Cont. Woodside, Northern Blvd.	Same as NAC; plus Rosedale, Laurelton, Locust Manor, Queens Village, Hollis, Thomson Avenue.	Same as NAC; allows Archer Ave. entries to reach 21 St., Roos. I, 63rd/ Lex. plus Richmond Hill, Woodhaven, Fresh Pond Road.
User Personal Security	New stations built to modern security standards.	Same as NAC; but GG riders must use long transfer passage at Court Sq.	Same as NAC plus 3 new stations; long transfer passage from Northern Blvd. to Queens Plaza.	Same as NAC plus 7 new stations; long transfer passage from Thomson Ave. to Queens Plaza.	Same as NAC plus 4 new stations; long passage as with MT, but less well-used.
Route Choice:					
Lines per Station	1.7	1.9	2.2	1.7	1.9
Stations with superior flexibility	0	3	7	0	1

Both effectively add new stations to the system -- the Transfer scheme by providing rapid transit service to stations that now have infrequent LIRR service (Rosedale, Laurelton, Locust Manor, Queens Village, and Hollis) and the Montauk/Archer by creating new transit stations at Fresh Pond Road, Woodhaven Boulevard and Richmond Hill. The Montauk Transfer would perform far better than any option, increasing access to 143,400 residents of Southeast Queens (a 12.5 percent increase in boroughwide accessibility). In the case of Montauk/Archer access would also be reduced for some who now can walk to the J line stations on Jamaica Avenue between Crescent and 121st Streets; however, the net result would be an increase in access for an estimated 28,500 people, or 2.5 percent of the year 2000 baseline.

6.2.3(c) Reduction of Annual Passenger Miles Traveled in "Uncomfortable" Conditions in the Queens Corridor

The comfort criterion reflects rider perceptions of congestion. Its measure would tell whether a patron could expect to ride a given option without being subject to overly crowded conditions. For this evaluation, comfort was measured on all lines in the corridor -- E, F, GG, RR, 7, J, K, B and QB -- for all options. Comfort has been assumed to be 150 passengers for the 75-foot cars on the IND and BMT lines and 100 passengers per IRT car; it defines a situation where all the seats are taken and there are a number of standees; however, there would be enough room, for instance, to walk through the car without encountering excessive conflict.

As shown on Table 6-3, all build options would perform better than the No Additional Construction option, offering a greater number of passenger miles at or better than the UMTA-recommended "comfort" level and reducing the mileage at or above the UMTA-recommended capacity. (As one can see by comparing Tables 6-1 and 6-3, the passenger miles above practical capacity would all be on the E and F lines, and need not be discussed here.)

Queens Bypass Express would be most effective in reducing passenger miles traveled at above the comfort level from No Additional Construction; Local Connection would be least so. This is due mainly to the service offered on the option itself. Both Montauk options would be effective in reducing passenger miles traveled at above comfort levels for the same reason. However, these options would be more effective than the other two "build" options in reducing passenger miles traveled at above target capacity. The reason can be attributed to the heavy diversion from the E and F lines on the eastern part of that route as well as the diversion from other subway lines in the corridor.

In considering this measure, it should be noted that peak hour conditions are designed to meet practical capacity, not comfort, levels. It would not be cost effective to do otherwise. However, passengers view comfort as an important amenity and, to the extent that service approaches this condition, will prefer it.

6.2.3(d) Accommodation of the Elderly and Handicapped

Physical barriers often impede the ability of the elderly and handicapped to use a transit system. These barriers include stairs, which those in wheelchairs or in poor health cannot negotiate, and narrow exits and entries. In the build options, all new or reconstructed stations will be built for "barrier free access" and will offer ramps, elevators, and adequate entryways, as appropriate, to allow the elderly and particularly the handicapped access to the system. However, because most of the City's transit facilities are not accessible the ability of the handicapped to use the system will still be restricted. Manhattan stations that can accommodate these users would be limited to 63rd Street/Lexington Avenue, 42nd Street/Eighth Avenue, and Grand Central/Lexington Avenue IRT line. Of these, only 63rd Street is usable by handicapped passengers on any of the build options; in-system transfers to get to those stations that are not served directly by a given option are virtually impossible. Therefore, although the Queens Express Bypass, Montauk Transfer, and Montauk/Archer options will add to the City's stock of stations accessible to the elderly and handicapped, they cannot be said to perform successfully or significantly differently from one another. The Local Connection, which would add no new stations, would permit handicapped patrons entering the new stations on the Archer Avenue/Hillside Connector lines to reach 63rd Street/Lexington Avenue in Manhattan. This effect is similar to the other build options, in that it offers a minor improvement over No Additional Construction.

6.2.3(e) <u>User Personal Security</u>

User personal security is a relative assessment of the users' perception of their personal safety. Factors such as lighting, cleanliness and newness of equipment contribute to a feeling of passenger security. The measure of security accounts for several items: new or upgraded stations; number of long passageways; and occurrence of circuitous pedestrian access (e.g., blind corners).

The Montauk Transfer option, which will provide new or upgraded stations all along the route, would be most successful in providing user personal security. The new or upgraded stations will be designed to current standards that provide for open spaces in waiting areas, good lighting, and clean lines of sight and avoid the creation of isolated areas. In the case of Montauk Transfer, station upgrading at the existing LIRR stations and increased use of these stations will markedly improve user security there. At the Thomson Transfer station, however, a long passageway to Queens Plaza with a change in level will require the realignment of a token booth and remote surveillance equipment to provide good observation.

Montauk/Archer would also provide new or upgraded stations along the entire route, although the number of stations (four) would be fewer than the seven provided with Montauk Transfer. This option would create a similar transfer passageway between Queens Plaza and the Thomson Avenue station. However, because this option would offer through subway service, the number of passengers using the transfer passageway to Queens Plaza would be less than with the Montauk Transfer, making the corridor appear less secure.

The Queens Bypass Express, which would offer new stations at Woodside and at Northern Boulevard, would perform similarly to Montauk Archer. It would create one long transfer passageway - - between Northern Boulevard and Queens Plaza.

The Local Connection would affect perception of user security for passengers transferring from the GG to the E or F line. Instead of the current transfer at Queens Plaza, GG service would end at Court Square. There, GG passengers would traverse a 360-foot long passageway to the 23rd-Ely station to continue their Manhattan or Queens-bound trips. Although a token booth would be realigned and remote surveillance installed, the perception of user security for GG riders would be reduced.

6.2.3(f) Flexibility in Choice of Route

This type of flexibility is measured by the number of lines directly available at each station along a given option's route. This gives some idea (albeit a simplified one) of the number of choices (irrespective of travel times) available to passengers entering an alternative route. As seen in Table 6-3, the Queens Bypass Express option would perform better than the other options in this regard. Its average of 2.2 lines serving its stations would be higher than the others and it would also outpace them at seven of the 17 stations they have in common. The Local Connection would offer more flexibility than the others at two stations, and better-than-average at one. Montauk/Archer would provide better flexibility from one station -- Parsons-Archer/Sutphin-Archer. In short, Bypass Express would perform measurably better than the others, Local Connection and Montauk/Archer would be similar to each other, and No Additional Construction and Montauk Transfer would do least well.

6.2.3(g) Operational Reliability and Flexibility

Operational reliability measures the ability of each alternative to provide on-time service and adequate scheduled capacity during the peak hour. Analysis of existing subway and LIRR service in Queens has shown that the primary factor involved in maintaining peak hour capacity is the number of times trains cross over between tracks and are merged onto tracks on which other trains are operating. The switching operations involved in these moves reduce capacity and create delay.

To measure the likelihood of delays, the number of merges, crossovers, and trains turned was tabulated for each alternative, and a weighting factor was estimated to take into account the length of the time interval in which the merge or cross over could be accomplished without delaying other trains. The greater the number of trains per hour involved in a merge, the greater the weight, and the greater will be the likelihood that trains will be delayed. Field investigations also showed that delays east of Continental Avenue are exacerbated by crowding at Roosevelt Avenue and Queens Plaza. Options which reduce crowding will add slack and therefore reliability to operations.

The major potential delay due to merges and crossovers occurs at the 71-Continental station-Jamaica Yard leads-Jamaica-Van Wyck merge on the Queens Boulevard line. Other potential delay locations are Jamaica, Queens Village and Valley Stream stations for the LIRR Queens-oriented service trains. No Additional Construction will have the largest potential for delays due to increased crowding. Delays encountered today are expected to worsen. The Montauk Transfer would have the largest potential for delay of the build options, significantly greater than the others. This is primarily because there would be two new terminals at Thomson Avenue for the subway and the LIRR and because of the interaction of Queens-oriented service LIRR trains with regular commuter LIRR operations at the Jamaica complex.

The Montauk/Archer is the next most reliable operation. It has the largest number of additional trains and operates the Parsons/Archer terminal at capacity.

The Local Connection has the second simplest subway operation and the second greatest diversion. This will be the second most reliable operation. The Queens Bypass has the greatest diversion, which will eliminate almost all of the crowding. It is the only option which has spare capacity -- some E and F trains could be added. In addition, the Super Express route will simplify merging operations at 71st-Continental Avenue.

Operational flexibility is measured by the existence and available capacity of alternate routings which can be used in the event of a service outage on a line segment. For each option, critical track sections (those which contain either a put-in, merge or crossover point) were selected. The ability to reroute trains under scenarios in which a service outage occurs was measured by examining the number of trains which could be diverted to other lines or tracks, based on available capacity on the alternatives being considered.

Queens Bypass Express and Local Connection perform well on this criterion because the 63rd Street, 60th Street and 53rd Street Tunnels can provide additional or back-up through-put for Queens Boulevard local and express trains. The Montauk Transfer would be less flexible, but it would provide an alternative route for LIRR trains bound for Manhattan, in the event the LIRR Main Line is obstructed. The Montauk/Archer would not provide significant alternatives for rerouting of either subway or LIRR trains, but passengers could transfer to and from the Queens Boulevard line at the Sutphin Boulevard and Parsons Boulevard Stations in Jamaica, allowing them an additional alternative route. The No Additional Construction option would provide a similar passenger routing alternative for J line riders, but would provide little additional operational flexibility.

6.2.3(h) Maintenance of Service

This measure indicates the degree to which an alternative permits existing service to be sustained during construction. It takes into account the length of construction, the number of lines affected and the degree to which construction impacts operation on a given line.

The Montauk Transfer would impact the Queens Boulevard and the Astoria lines when the 63rd Street Tunnel is extended into Sunnyside Yard. The 63rd Street line will pass under both the Astoria and the Queens Boulevard subway requiring underpinning of both structures. Trains will operate at reduced speeds, and service may be suspended for several evening hours during underpinning. Underpinning for the Queens Boulevard viaduct over Sunnyside Yard may also affect Flushing line operations.

The Montauk Transfer would disrupt LIRR freight and passenger operations during reconstruction of the line. Freight operations at Sunnyside Yards will be permanently affected, and increased use of the Montauk Branch by peak hour passenger trains will cause some inconvenience to freight service. Some disruption to LIRR passenger service may be caused through station improvements at Southeast Queens Station, but no serious impacts are expected.

The Montauk/Archer option has impacts similar to the Montauk Transfer option. However, there is the additional impact imposed through the connection to the Jamaica Elevated. It is expected that Jamaica Elevated service would be cut back at least to 111th Street during construction. Since the ultimate plan requires cutting the Elevated back to Crescent Street, it would be possible to demolish the structure and substitute bus service during construction.

The Local Connection would have an impact on off-peak GG, F and RR service during construction. The connection for the westbound tracks involves breaking through the existing Queens Boulevard line sidewall. As this work is being done during late evening and early morning hours, Queens Boulevard local trains will be rerouted to the express track around the breakthrough area. Connecting the eastbound tracks is more difficult. A shielded tunnel will be constructed under the four existing tracks. Until the tunnel is lined, about nine months from the start of tunneling, trains will pass over the tunnel at reduced speed to minimize vibration and settlement. As with the westbound track, local trains will be rerouted around the construction areas as the existing eastbound sidewall is demolished. The physical connection between the existing and new tracks can be made over a weekend. The Astoria line will also experience service disruptions because the columns supporting this line must be underpinned where the new tunnel passes under them. Astoria line RR trains will proceed at reduced speeds, and service may be altogether stopped for a few evening hours as the underpinning is done.

The most severe operational impacts during construction will be created by the Queens Bypass Express. Tunneling under the Queens Boulevard line and connection of the bypass to the Queens Boulevard local tracks east of 71-Continental Avenues and to the 63rd Street Tunnel will cause the same types of disruptions in each area. In addition, construction beneath and along the LIRR Main Line will cause continual service disruptions. Five bridges along the LIRR need to lengthened and 18 bridge superstructures will be added to accommodate the subway tracks. While work is being done adjacent to the south side LIRR local tracks, eastbound trains must be rerouted to the eastbound express tracks (Main Line 2) to provide adequate worker protection. Bypass express construction will be limited to the 9:30 AM to 3:30 PM period on weekdays so that the LIRR has use of all four Main Line tracks during the morning and evening rush hours.

6.2.3(i) Future Service

Each option has been evaluated for its ability to allow the system to expand physically and/or provide greater service in the future. Expansion through new construction would include the eventual implementation of the Southeast Queens Extension (an element in the earlier new routes program). Greater service on the system refers to increases in the number of trains provided or variety in routing that could be provided with a given option in place. All options provide for potential extension of the Long Island Rail Road to connect with the lower level of the 63rd Street Tunnel.

With No Additional Construction, implementation of any of the other options could clearly go forward at any time, as could the construction of other projects such as the Southeast Queens Extension. However, there is a strong potential for development on the parking lot on the northwestern side of Northern Boulevard just east of the terminus of the current construction. Should this occur, new construction would involve greater dislocation and expense than it would now, and could even be effectively precluded (MTA has begun to acquire this property). Increase in the number of trains scheduled with the No Additional Construction option, while theoretically possible, would not be expected. Manhattan-bound service from Archer Avenue would be operated at capacity and an increase in number of trains would not be possible. Capacity would be available in the 63rd Street Tunnel, but the route in Queens is so limited that no demand increase is expected.

The Local Connection could be constructed to allow for future development of any of the other options. However, construction of the Bypass or either Montauk scheme would require discontinuation of the Local Connection service.

The Local Connection, as configured, would not rule out construction of the Southeast Queens Extension. However, peak hour operating capacity would be so limited by the existing conditions east of the connection, that the use of the new line would be limited. The potential for increased service on this option even without the Southeast Queens Extension would also be limited by these same capacity restraints.

The Bypass was designed for and would allow future construction of the Southeast Queens Extension. It would provide the additional operational capacity to serve this potential expansion. As contemplated now, without a Southeast Queens Extension, the Bypass could handle additional service; moreover, it also would create some service flexibility for the E and F line. However, future access to the 63rd Street Tunnel from the Montauk Line would be effectively excluded.

Construction of the Montauk Transfer option would effectively preclude construction of the Queens Bypass, because the eastbound leg between the existing construction and the Bypass would have to go under the Montauk connection and require extensive property taking and reconstruction west of Northern Boulevard. Therefore, the scheme would never provide subway service to a potential Southeast Queens Extension, nor could such an extension utilize the 63rd Street Tunnel. However, by upgrading the LIRR stations in Southeast Queens, it would serve southeastern Queens, penetrating even further than the Extension. In addition, operations on this option could extend further into Nassau and Suffolk Counties but would be limited by the peak hour capacity restraints of the LIRR.

As in the Transfer option, the construction of the Montauk/Archer option would exclude construction of the Queens Bypass in future. Service to a potential Southeast Queens Extension would have to be through a transfer at Archer Avenue. This two-level change in trains would be inconvenient, but certainly possible.

Increases in service on this option during peak hours would entail major construction at the east end of the Archer Avenue line to permit the efficient turnaround of trains. This construction would require extensive excavation and an approximate cost of $50 million at 1983 price levels.

In short, the Bypass would offer the greatest potential for both physical and operational expansion in the future; Montauk/Archer could accommodate some physical expansion but the opportunity for service increase would be limited; similarly, the Local Connection could link physically to an extension, but service expansion would be unlikely; the Montauk Transfer could offer the least in the way of future subway service to Queens residents.

6.3 Efficiency

Efficiency, in its application to the evaluation of the Queens Subway Options, measures and compares the options overall benefits and costs. In a typical analysis of transit alternatives involving new construction, benefits would include, in addition to improved transportation service, reduction in both air pollution and energy consumption from diversion away from automobile usage, and more improved economic development, as urban sprawl gives way to a more rational pattern focused on a new transit system. For this evaluation, however, the latter three benefits do not pertain. As explained in Chapter 4, transit usage in the Queens corridor is extremely high, representing 86 percent of Manhattan-bound, journey-to-work trips. Under the circumstances, it would be overly optimistic to assume that any diversion from automobile usage could take place were one of the options to be implemented. Neither could the attendant benefits of such a diversion be assumed. In addition, the areas whose development could be affected by a new or improved transit service are now fully built-up, complete with all urban infrastructure. Analysis of the impacts of the options on land use found them to be quite limited and localized (see Chapter 5 and Section 6.4). Therefore, the benefit side of the efficiency evaluation has been limited to measures of achievement of transportation goals: relief of overcrowding on the E and F lines; utilization of existing capacity in the Queens corridor; and improvement in transportation service to the corridor.

Costs can include both monetary and the less quantifiable costs, such as the negative impacts of displacement, increased noise levels, etc. These latter effects tend to be felt in specific areas and cannot be expressed, without great difficulty and danger of oversimplification, as systemwide costs. For this reason, the impact "costs" are examined and options evaluated in terms of who benefits and who pays in the next Section, 6.4 Equity. For the efficiency analysis, capital and operating costs are evaluated in comparing the efficiency of each option in meeting the project's transportation goals.

6.3.1 Cost Comparisons

Cost is an important determinant in the evaluation process. While the highest significance may not always be attached to the cost characteristics of a given alternative, a realistic assessment of economic considerations is essential to options evaluation. Summarized here for comparison are the capital costs, risk and range (assessment of the relative probability of cost overages), operating costs, revenue generation, and operating deficit.

6.3.1(a) Capital Costs, Risk and Range

Capital costs include construction, administrative/engineering, property acquisition, equipment and yards, and have been estimated in 1983 dollars. (Specific methods of estimation, inflation and discount rates, etc., are discussed in detail in Working Paper Number 10 and are summarized in Section 2.5 of this EIS.) As shown in Table 6-4, total capital costs for the Queens Bypass Express option of $931 million would far exceed those of any other option. The large cost items would be associated with the extensive heavy construction necessary at the western end of the line, and the purchase of new rolling stock. Capital costs for the two options on the Montauk Branch would come to about 60 percent of the Bypass: $594 million for Montauk/Archer and $488 million for the Transfer. Differences in cost between the two are attributable to the need for a segment of third track with the Montauk/Archer scheme, as well as greater modifications to Yard 'A', higher cost of new rolling stock, and work on the Fresh Pond Freight Yard for that option. Capital costs for the Local Connection of $222 million would be significantly lower than any other build option. Clearly, this option, which simply makes a connection between the local Queens Boulevard line tracks and the 63rd Street Tunnel and involves no new trackage or stations, would require much less construction than the other alternatives. Expenditures for new rolling stock would also be less.

TABLE 6-4

SUMMARY OF CAPITAL COSTS
(millions of 1983 dollars)

	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Construction Cost	54.0	464.3	207.8	256.0
Yards and Maintenance Facilities	7.3	32.9	9.2	29.3
Rolling Stock	136.2	272.2	197.0	212.6
Right of Way	5.4	7.1	6.6	7.2
Mobilization	1.9	15.1	6.6	8.6
Administation Engineering	6.9	53.2	22.7	31.7
Supervision and Fare Account	4.9	39.8	17.3	23.0
Contingency	5.4	46.4	20.8	25.6
TOTALS	222.0	931.0	488.0	594.0
Estimated cost differential from unknown conditions	10	85	25	30 - 16*

* Minimum benefit from removing the Jamaica El (see discussion).

In assessing capital costs, a contingency factor, related to possible problems during construction, is added. This accounts for increased costs from schedule delay and unexpected complexity, and amounts to 10 percent of construction cost estimates. Beyond this contingency, there is some risk that, in working on an old system, underground, there may be greater cost overruns.

The Queens Bypass Express would offer the greatest risk of cost overrun from unknown conditions. The eastern section of the Bypass between the Long Island Rail Road and the Queens Boulevard subway line would require major underground construction in Yellowstone Boulevard, affecting a large sewer and other utilities. Construction procedures required in this area may have to be somewhat different than has been assumed, if actual underground conditions vary from assumptions made using available material. The construction might also affect adjacent properties. For the eastern section of the Bypass therefore,variations of 15 percent to 20 percent might be expected. For the remainder of the line, the requirements for widening 18 railroad structures also involves conditions that may be found to be somewhat different than assumed and variations of 10 percent to 15 percent would not be unexpected. An increase in capital costs could from unexpected complications come to as much as $85 million.

Construction for the Location Connection would involve substantial excavation under Northern Boulevard and the adjacent properties. While the cost estimates are based on examination of available utility and subway plans, there is a likelihood that actual conditions may be somewhat different than anticipated. As a result, final cost estimates may be somewhat different than currently expected. In addition, the estimates included herein assume that the adjacent property affected by the construction will be acquired. It is possible that in final negotiations some properties will be underpinned and will remain or only be partially acquired. The costs therefore may be either greater or less than those estimated. For this option, variations in costs of 10 percent to 15 percent may be expected, amounting to about $10 million.

Both of the Montauk Branch options are subject to fewer unknowns than for the Local Connection and the Bypass because they are almost entirely at grade or on existing elevated structure. The minimum of work underground reduces the likelihood of variations in cost estimates, and the construction-related costs are not likely to vary by more than 10 percent from the total amounts estimated. This would translate to less than $25 million for Montauk Transfer and $30 million for Montauk/Archer.

An additional circumstance will affect Montauk/Archer costs—and will tend to reduce them. As part of this option, the Jamaica Elevated line would be demolished between Cresent Street and the Parsons Boulevard/Archer Avenue Stations. The cost of this demolition has been included in the capital cost figures for this option. (The operating costs also reflect the closing of this section of the Elevated, which has seven stations, crediting the savings to the option total.)

However, not included in capital costs, but definitely a factor, is the savings that could be realized by not having to rehabilitate this section of the Jamaica Elevated. The structure is approximately 75 years old and, like many other facilities, will have to be rehabilitated to maintain it in a state of good repair. The NYCTA is evaluating the Elevated for the types of structural work that will be necessary. Currently identified in the current capital program is approximately $16 million for two projects, a substation and structural improvements. Other items that may have to be rehabilitated, include track and signal system replacement, reconstruction and modernization of platforms, and other structural improvements.

As seen on Table 6-4, the reduction of $16 million is acknowledged. But the additional savings cannot be estimated at this time and are therefore not included.

6.3.1(b) Operating Costs

Operating costs are those annual expenses necessary to deliver transit services on a recurring basis. As described in Working Paper Number 8 and summarized in Section 2.5 of this EIS, operating costs were predicted for each option including subway service, feeder bus service, and commuter rail costs factors including: labor, right-of-way, system and equipment maintenance, administration, materials and supplies, energy, and insurance.

As shown on Table 6-5, the incremental annual operating cost (over existing conditions) of the Montauk Transfer option, at $47.0 million, would be significantly greater than those of the other options, and over three times the incremental costs ($13.8 million) of No Additional Construction. This difference results from additional mileage on the line (it extends nearly to the Queens/Nassau border), from use of LIRR trains, which have higher labor and maintenance costs, and from increased use in feeder bus service to the easterly stations on the line. Queens Bypass Express, with $36.3 in incremental annual operating costs, would be substantially less than the Transfer, but greater than the Local Connection and Montauk/Archer, with $21.7 million and $27.1 million, respectively. The higher operating costs for the Bypass are generated by this option's greater service (number of cars per hour schedule).

6.3.2 Equivalent Uniform Annual Costs

For the efficiency evaluation, it is necessary to express the capital and operating costs of each option in terms of an equivalent annual outlay during the life of the facility. Clearly, one option with a high construction costs but low operation and maintenance might do as well or better over the long term than options that require low capital expenditures but high annual operating costs. The equivalent uniform annual cost was therefore developed to allow operating and capital costs to be combined and compared.

Both capital and incremental operating costs were annualized as follows. First, the costs of each option were allocated to the years in which they are to be spent. Then, the present worth of the costs were estimated, using a 10 percent discount rate. As can be seen on Table 6-6, the present worth of the capital dollars for the Queens Bypass Express would be about a third of the total, because the money is to be spent 10 to 15 years from now. By contrast, the present worth of capital costs for the Local Connection, which would be completed within nine years, would be about half the total.

TABLE 6-5

INCREMENTAL OPERATING COSTS OF OPTIONS IN THE YEAR 2000
(millions of 1983 dollars)

	No Additional Construction	Local Connection	Queens Bypass	Montauk Transfer	Montauk/ Archer
Incremental Operating Costs					
Subway	14.9	22.8	37.4	19.7	24.7
LIRR	0	0	0	25.9	1.2
TA Bus	-1.2	-1.2	-1.2	1.3	0.3
Private Bus	0.1	0.1	0.1	0.1	0.9
TOTAL	13.8	21.7	36.3	47.0	27.1
Increase in Cost over No Additional Construction					
Subway	--	7.9	22.5	4.8	9.8
LIRR	--	0.0	0.0	25.9	1.2
TA Bus	--	0.0	0.0	2.5	1.5
Private Bus	--	0.0	0.0	0.0	0.8
TOTAL	--	7.9	22.5	33.2	13.3

The present worth was then expressed in terms of an average annual expenditure over an assumed 30-year life of the facilities and equipment. (In fact, much of the infrastructure lasts for 50 years.) As shown on Table 6-6, the annualized capital costs would range from about ten to 30 million dollars (1983) a year, with Local Connection at the low end, Queens Bypass at the top, and both Montauk options halfway between. Operating costs, annualized over the same period, would range from about $13 million for the Local Connection and Montauk/Archer, up to $21.5 million for Montauk Transfer.

The annualized capital costs were then added to the annualized incremental operating costs to construct the Equivalent Uniform Annual Costs (EUAC) for each option. As seen on Table 6-6, Queens Bypass Express and Montauk Transfer would require the highest EUAC, $46.4 and $42.0 million, respectively. In the case of the Bypass, the high EUAC would be due to high capital costs; the Montauk Transfer, because of its LIRR component, would have very high operating costs. Local Connection, at $23.7 million, would have the lowest EUAC (a bit less than half that of the Bypass and Transfer), and Montauk/Archer would be at about mid-range, with $34.4 million.

6.3.3 Measures of Efficiency

Four measures of the options' efficiency in providing transportation benefits were selected for the evaluation: (1) EUAC per the reduction in annual passengers above target capacity on the E and F lines over No Additional Construction; (2) EUAC per annual passenger brought to the 63rd Street tunnel; (3)

TABLE 6-6

ESTIMATED EQUIVALENT UNIFORM ANNUAL COSTS
(millions of 1983 dollars)

	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Capital Cost	222	931	488	594
Years of Actual Expenditure	1985-1993	1985-1998	1985-1995	1985-1997
Present Worth	101.8	300.5	193.4	200.3
Annualized Capital Costs	10.8	31.9	20.5	21.3
Annualized Incremental Operating Costs	12.9	14.5	21.5	13.1
Equivalent Uniform* Annual Costs	23.7	46.4	42.0	34.4

* Annualized capital costs plus annualized incremental operating costs.

EUAC per passenger minute saved over No Additional Construction; and (4) EUAC per reduction in passenger miles traveled in the Queens corridor above target capacity.

As seen on Table 6-7, the Local Connection would be most efficient in reducing overcrowding on the E and F lines at $2.20 of equivalent uniform annual cost per reduction in annual ridership above the UMTA target capacity of 195 passengers per car. Montauk Archer and Queens Bypass Express would be somewhat less efficient with $3.70 and $4.10, respectively, and Montauk Transfer, at $5.50 would be least efficient. It should be noted that by modifying the operating schedule to increase the number of trains per hour, Queens Bypass Express could eliminate all overcrowding on the E and F lines. By reducing the 12.7 million increment above target capacity to zero, however, the option's efficiency rate would only decrease to $3.70.

In terms of utilizing existing system capacity, the second transportation goal, both Local Connection and Queens Bypass Express, with 90 and 80 cents per annual passenger brought to the 63rd Street Tunnel, respectively, would be most efficient. Montauk/Archer would run a close second, at $1.10, and Montauk Transfer, with a high EUAC and low ridership, would perform the least well at $2.60.

All options would perform efficiently in reducing passenger minutes traveled in the corridors—an important measure of transportation service improvement. Local Connection and Montauk/Archer, each with five cents per passenger minute saved, would be the most efficient. Queens Bypass Express, at eight cents per

TABLE 6-7

EVALUATION OF EFFICIENCY OF OPTIONS
(millions of 1983 dollars)

Measure	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Equivalent Uniform Annual Cost per Reduction in Annual Passengers Above Target Capacity on the E & F Lines	\$2.20/p	\$4.10/p*	\$5.50/p	\$3.70/p
EUAC per Annual Passenger Brought to 63rd Street Tunnel	\$0.90/p	\$0.80/p	\$2.60/p	\$1.10/p
EUAC per Passenger Minute Saved	\$0.05/p min	\$0.08/p min	\$0.18/p min	\$0.05/p min
EUAC per Reduction of Passenger Mile Traveled at Above Target Capacity in the Queens Corridor	\$0.36/p mile	\$0.45/p mile*	\$0.35/p mile	\$0.27/p mile

* By altering the operating schedule, QBE could reduce the increment above target capacity by 12.7 million (to 0); if so the EUAC/p would equal \$3.70; QBE could also reduce the number of annual passenger miles traveled in the Queens corridor at above target capacity by an additional 42 million, bringing its EUAC/p mile to \$0.32.

passenger minute saved would do slightly less well, and Montauk Transfer, at 18 cents, would be the least efficient of the group.

Lastly, another measure of efficiency in improving transportation service was examined—EUAC for reduction of passenger miles traveled above target capacity in the Queens corridor. This efficiency measure is similar to the first one, but with two important differences: it evaluates corridor-wide performance, and it includes a measure of duration of travel in uncomfortable conditions. The results are telling: Montauk Archer, which diverts ridership from the E and F trains on the eastern end of the line and which also draws from other lines, would be most efficient, at 27 cents per reduction in overcrowded passenger miles. Local Connection and Montauk Transfer, with 36 cents and 35 cents respectively would perform less well, and Queens Bypass Express, at 45 cents, the least efficient of all. However, with modification of its operating schedule, this option's efficiency could be improved to about 32 cents per reduction in overcrowded passenger miles traveled.

6.4 Equity

6.4.1 Introduction

The previous sections of this chapter examined various system-wide transportation and financial-related criteria in order to evaluate and compare the Queens Subway Options. Each of the build options is, however, more than simply a means to improve transportation services and improve the utilization of existing investments. Each is also major borough-wide construction project that would have a variety of impacts comparable to other large construction projects. Each option would leave behind certain permanent physical changes which could also affect local areas. In certain cases the communities that would experience the benefits from the improved service or accessibility would not be the same communities that would experience the negative impacts—or the benefits received and costs encountered would be out of proportion to each other. Evaluating the balance between costs and benefits at the local rather than regional or borough-wide level is the prime means of evaluating the equity of each option and is the subject of this section.

As described in this section, costs include specific permanent physical changes which can adversely affect community activity and quality of life and the assorted types of disruption caused by construction of the improvements. Specific measures of costs which distinguish one option from the others include residential and job displacement, disruption to transit service (either temporary disruption due to construction or permanent changes), other temporary disruption due to construction, changes in local traffic and circulation patterns, noise, visual quality, and parks.

For the purposes of evaluating equity, the comparative dollar costs of each option—which are discussed in Sections 6.3 and 6.5—are not included because, regardless of option, the funding would come from the same source. Other factors which were described in Working Paper Number 17: Evaluation Procedures, (August 1983), but which are not measurably different among the options, are not discussed below, although they are discussed in Chapter 5, Environmental Consequences. These include: land use, secondary development, air quality conditions, vibratory levels, energy conservation, or significant facilities and resources and assorted impacts related to the existing program, such as demolition of sections of the Jamaica Elevated west of Sutphin Boulevard.

Benefits that distinguish the four build options include: improving or expanding service, particularly the provision of service to previously underserved areas or population groups (thereby improving social mobility), relief of overcrowding and the provision of more comfortable rides to existing users, time savings from specific locatons, improved user security, reduction in hazard potential along the alignment, and permanent physical changes which can improve or rectify existing problem conditions.

6.4.2 Queens Boulevard Line Local Connection

6.4.2(a) Costs

Displacement. A total of 380 jobs in ten firms would be displaced under this option, the greatest amount of all the options (see Table 6-8). Most of these jobs are located in one six-story industrial building on Northern Boulevard. Most are manufacturing jobs. No residential uses would be displaced. Details on displacement are described in Chapter 5.

TABLE 6-8

RESIDENTIAL AND JOB DISPLACEMENT

	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Residential Units Displaced	0	50	1	1
Number of Jobs and Firms Displaced				
Jobs	380	225	81	160
Firms	10	29	3	15

Service Disruption (Permanent Impact). The elimination of through service on the GG line from Brooklyn past the Court Square Station would require current GG passengers to transfer to the E and F lines at 23rd Street/Ely Avenue Station via a 360 foot long passageway, providing some inconvenience to these riders.

Service Disruption (From Construction). Generally, construction of the Local Connection option would create significantly less disruption to existing transit services than the other build options. Construction of all build options would disrupt service on the Queens Boulevard and Astoria lines, requiring speed restrictions on the E, F, GG and N lines for nine months and the closing of the RR line for two to four weekends. The Local Connection option would also require late night rerouting of the Queens Boulevard Local to the express track for 1½ years and 24 hour rerouting of Queens Boulevard Local to the express track for two to three weeks.

Other Construction Disruption. There would be some disruption of activity along Northern Boulevard during a two year construction period and a loss of parking spaces which could increase the demand for parking in other locations. These are described in more detail in Chapter 4, Transportation Impacts.

User Personal Security. Despite extensive security measures, the 360 foot long passageway between the Court Square and 23rd/Ely Station may be perceived by patrons as a security problem.

6.4.2(b) Benefits

Relief of Overcrowding. As described in Section 6.2.1, this option would be moderately successful at relieving overcrowding on the E and F lines, a major goal of the program. It would be considerably less successful than the Bypass Express option, comparable to Montauk/Archer and more successful than Montauk Transfer. Service benefits would accrue primarily to residents along the Queens Boulevard line transit corridor particularly those residing in Forest Hills, Rego Park, Elmhurst, Corona, Jackson Heights, Astoria and Long Island City.

Improved Service to Underserved Areas or Population Groups. This option would provide new or improved services to areas which already are served by transit and would improve service to large and growing transit dependent populations in Elmhurst, Corona and Jackson Heights.

6.4.2(c) Equity: Who Pays?/Who Benefits?

The Local Connection option would relieve some overcrowding on the Queens Boulevard line and would provide improved service, primarily benefiting residents along the Queens Boulevard line transit corridor, including some neighborhoods with high concentrations of transit dependent populations.

Negative impacts would be relatively limited, but would primarily affect those who would not benefit from the option: some businesses which would have to be displaced in the vicinity of Northern Boulevard; some disruption would be caused by construction in that same area; commuters on the GG train from Brooklyn to Queens would be inconvenienced by the termination of through service (free transfers would be available to allow a continuation of Brooklyn crosstown service for these commuters); and commuters on the Queens Boulevard and Astoria lines would also be temporarily inconvenienced during construction.

6.4.3 Queens Bypass Express

6.4.3(a) Costs

Displacement. The Bypass Express is the only option that would require a substantial level of residential displacement—approximately 50 dwelling units would be displaced along the alignment. It also has the second greatest level of job displacement—an estimated 225 jobs in 29 firms would be displaced as a result of this option (see Table 6-8). Both the dwelling units and jobs are spread out along the alignment and not concentrated in any single location. Unlike the Local Connection, the displaced jobs are not concentrated in any single economic sector.

Service Disruption (From Construction). The Queens Bypass Express option would be the most disruptive of all options to existing transit services. The LIRR Main Line would experience off peak delays for three years and 24 hour speed restrictions for nine months. In addition, impacts on the Queens Boulevard and Astoria lines would be similar to those described under the Local Connection option.

Other Construction Disruption. There would be substantial disruption caused by construction activities along the route of the alignment including temporary detours, lane closures and alternate routing at various points. Particularly severe impacts would occur in the vicinity of Yellowstone and Queens Boulevard where access to shops and the subway station would be impaired. These are described in Chapter 4.

Noise. A substantial increase in the frequency of service on the line, particularly overnight when there is currently little use of the alignment, would create more intrusive noise impact, though existing standards would not be exceeded.

Visual. Similarly to noise, the expansion of frequency of service would have a visual impact along the transit corridor as well.

Parks. Construction activity would increase noise and dust levels and limit entry to a small portion of Gerald McDonald Memorial Park, a heavily used park (particularly by the elderly) in the vicinity of Queens and Yellowstone Boulevard.

6.4.3(b) Benefits

Relief of Overcrowding. As detailed in Section 6.2.1 this option would be by far the most successful at diverting passengers from the E and F lines and most successful at relieving existing overcrowding on those lines. Prime beneficiaries would include residents in Forest Hills, Rego Park, Elmhurst, Corona, Jackson Heights, Long Island City, Woodside and Sunnyside.

Improved Service to Underserved Areas or Population Groups. As with the Local Connection, this option would provide new or improved services to areas which already are served by transit. Transit dependent populations in Woodside, Sunnyside, Elmhurst and Jackson Heights would also benefit from the improved service.

6.4.3(c) Equity: Who Pays?/Who Benefits?

The prime benefit provided by the Bypass Express option would be substantial relief of overcrowding for residents along the existing Queens Boulevard line transit corridor. Prime beneficiaries would be concentrated in communities along the Queens Boulevard line corridor, particularly in Forest Hills, Rego Park, Elmhurst and Jackson Heights. Transit dependent populations in Sunnyside, Woodside, Elmhurst and Jackson Heights would also benefit from this new service and improved conditions as well under this option. This option would also have substantial negative impacts and these would not be as geographically concentrated as under the Local Connection. These are primarily related to property acquisition and construction activity along the alignment. The greatest impact would be concentrated near the 71st-Street Continental Avenue Station in Forest Hills, particularly on Queens and Yellowstone Boulevards. These impacts would be temporary and this general area would reap substantial benefits from the new service. Service on the Long Island Rail Road Main Line would also be substantially disrupted, without a corresponding increase in benefits. Residential and commercial/industrial uses would be displaced along the alignment without particular benefit. There would be noise and visual quality impacts along the transit corridor as well, resulting from the expansion of service and comparable benefits may not accrue to many residents along the corridor. Residents along the Queens Boulevard line in Elmhurst and Jackson Heights who would benefit from this option would not bear any significant costs.

6.4.4 Montauk Transfer

6.4.4(a) Costs

Displacement. One residential unit on 88th Street would be displaced as a result of this option. In addition, an estimated 81 jobs in three firms would be displaced as a result of this option, the least displacement of all the build options.

Service Disruption (From Construction). In addition to affecting the Queens Boulevard and Astoria lines as described under the Local Connection, construction of this option would cause delays for off-peak and weekend trains at the Long Island Rail Road Jamaica Station for one year which would affect the Long Island Rail Road Main Line, Montauk and Atlantic Branches. Delays would also be created for freight trains on the Montauk Branch for two years. This option would also require the closing of the Flushing line (# 7) for two to four weekends.

Other Construction Disruption. The elimination of existing grade crossings and the construction of bridges to cross the tracks would provide some inconvenience for local traffic and circulation and impede the access to some businesses. These are described in Chapters 4 and 5 in more detail.

Local Traffic and Circulation (Permanent Changes). Due to the elimination of existing grade crossings at several locations along the alignment (88th Street, 73rd Street and Maspeth Avenues) there would be some increase in travel time and distance. These are described in Chapter 4.

Noise. At five sites along the alignment where measurements were taken—in Forest Park, near Christ the King High School, near Glen Ridge Park, and near two residential sites (at Traffic Avenue and 64th Street and near Admiral Avenue) predicted noise increases (with mitigation) would be above three dBA at certain hours—principally between 7:00 to 8:00 AM during the morning peak. These are significant impacts and would be representative of conditions along the entire alignment. The substantial increase in the frequency of trains on the existing alignment, particularly at night when there is currently very little usage, would also cause more intrusive noise impacts along the entire alignment even though standards would not be violated.

Visual. This option would have substantial visual quality impacts resulting from the increased number of trains on the alignment, the construction of bridges to cross the alignment, the erection of substantial security and noise barriers along the alignment, and the construction of transformer substations at four locations along the alignment.

Parks. The primary impact on parks near the alignment would result from more intrusive noise conditions and, in the case of Forest Park and Glen Ridge Park, predicted increases above three dBA but still within standards.

6.4.4(b) Benefits

Improved Service to Underserved Areas or Population Groups. This is the only option that would substantially improve service to residents in Southeast Queens who have limited service at the current time. It would also substantially improve service to the borough's most transit dependent neighborhoods in and around Jamaica and South Jamaica.

Accessibility. As measured by the number of persons within walking distance (0.8 miles) of a transit station, this option would provide the greatest increase in coverage of all the options. An estimated 143,400 persons would have direct access as a result of this option—six times that of any other option (see Section 6.2.3(b) for details).

Travel Time. The two Montauk options are the only options which would provide some substantial improvement in travel time between selected locations in Queens and midtown Manhattan (see Table 6-9). The Montauk Transfer option would particularly affect travel time from St. Albans and Woodhaven. Trips between St. Albans and midtown would be between 9 and 22 minutes faster than under all other options, with the greatest time savings to 57th Street and Sixth Avenue. Trip time between Woodhaven and midtown would be comparable to the Montauk/Archer option but between 10 and 21 minutes faster than all other options.

User Personal Security. As described in Section 6.2.3(e), this option would be the most successful of all options at improving user security. Seven refurbished stations would be designed to current standards that provide for open spaces in waiting areas, good lighting and clear lines of sight and would avoid creation of isolated areas. Increased use of the existing stations in Southeast Queens would also improve sense of user security.

Safety along the Alignment. Despite an increase in the number of trains on the alignment, safety conditions would improve under this option. By providing formidable security barriers along the alignment, this option should contribute towards cutting down on current crossings of the alignment which pose a safety problem now.

6.4.4(c) Equity: Who Pays?/Who Benefits?

The Montauk Transfer option would generate a variety of negative impacts to communities along the alignment, particularly in Glendale, Middle Village and Maspeth and to a somewhat lesser extent in Richmond Hill and Woodhaven. Some of the impacts could substantially affect the quality of life in these communities. These include substantial visual impacts along the alignment, more intrusive noise levels, and some significant noise impacts. There would also be some inconvenience due to changes in existing traffic circulation patterns. In addition, there would be delays for freight users along the Montauk Branch for up to two years, delays during off-peak and weekend hours at the Long Island Rail Road

TABLE 6-9

DOOR TO DOOR TRAVEL TIME
FROM SELECTED LOCATIONS IN QUEENS
TO THREE MANHATTAN LOCATIONS
(in minutes)

	No Additional Construction	Local Connection	Queens Bypass	Montauk Transfer	Montauk/ Archer
From Merrick & Springfield Blvds. (St. Albans)					
To 57th/6th	70.5	71.0	69.0	49.0	68.0
To 57th/Lexington	65.8	66.0	64.0	54.0	63.0
To Chambers St.	78.5	78.5	79.5	79.0	77.0
From Ascan Ave. & Austin St. (Forest Hills)					
To 57th/6th	41.5	41.5	41.5	41.5	41.5
To 57th/Lexington	36.5	36.5	36.5	36.5	40.0
To Chambers St.	49.5	49.5	49.5	49.5	49.5
From Liberty Ave. & 160th St. (Jamaica)					
To 57th/6th	49.0	49.0	49.0	49.0	52.0
To 57th/Lexington	44.0	44.0	44.0	44.0	47.0
To Chambers St.	60.5	57.0	57.0	57.0	61.0
From Jamaica Ave. & 104th St. (Woodhaven)					
To 57th/6th	51.5	51.5	52.5	31.5	31.5
To 57th/Lexington	46.5	46.5	47.5	36.5	33.5
To Chambers St.	47.0	47.0	47.0	49.0	46.0
From Fresh Pond Rd. & Eliot Ave. (Ridgewood)					
To 57th/6th	54.5	54.5	55.5	54.5	24.5
To 57th/Lexington	48.0	48.0	48.0	48.0	26.5
To Chambers St.	42.0	42.0	42.0	42.0	39.0

Jamaica Station affecting the LIRR Main Line, Montauk Branch and Atlantic Branch, the Flushing line would be closed for two to four weekends and riders on the Queens Boulevard and Astoria lines would be temporarily inconvenienced during construction as described under the Local Connection. Finally this option would provide little relief to the existing overcrowding on the E and F lines.

The substantial benefits under this alternative—a large increase in geographic coverage of transit services, vastly improved service to Southeast

Queens and to transit dependent populations in Jamaica and South Jamaica, improvements in travel time in areas such as St. Albans and Woodhaven, and improved user security—would be concentrated primarily in areas that would not be experiencing the costs associated with this option.

6.4.5 Montauk/Archer

6.4.5(a) Costs

The costs associated with the Montauk/Archer option are similar to those described under the Montauk Transfer option, with differences described below.

Displacement. A total of 160 jobs in 15 firms would be displaced as a result of this option (see Table 6-8 above). These would result primarily from the construction of bridges over the alignment and the construction of a new station at Fresh Pond Road.

Service Disruption (Permanent Impact). The demolition of additional sections of the Jamaica Elevated west of 121st Street to Cresent Street would eliminate existing transit stations on the J line and would cause an alteration in travel patterns for commuters in Woodhaven and Richmond Hill who now use those stations.

Service Disruption (From Construction). In addition to affecting the Queens Boulevard and Astoria lines as described under the Local Connection, freight service would be diverted to the LIRR Main Line from the Montauk Branch for two to three months, causing delays and inconvenience to existing freight users. Demolition of additional sectors of the Jamaica Elevated would require the closing of the lower level of the Archer Avenue line, requiring temporary alternative service (probably bus) for 18 to 24 months for current J train riders.

Other Construction Disruption. Demolition of the Jamaica Elevated would create additional temporary disruption to traffic and businesses on Jamaica Avenue in Richmond Hill and Woodhaven. The elimination of existing grade crossings and the construction of bridges to cross the tracks would provide some inconvenience for local traffic and circulation and impede the access to some businesses (see Chapters 4 and 5 for more details).

Local Traffic and Circulation (Permanent Changes). In addition to the minor changes described under Montauk Transfer, the bus drop-off area on the Woodhaven Boulevard viaduct would create a serious potential impact to through traffic on Woodhaven Boulevard. This is discussed in Chapter 4.

Noise. The greater frequency of service on the Montauk/Archer alignment would produce even more intrusive noise impact than the Montauk Transfer option. Also, significant noise increases (three dBA or more) are predicted at seven monitoring sites along the alignment. In addition to the ones described under the Montauk Transfer, these include two residential sites—one at 77th Avenue and 79th Place and the other at Babbage and 115th Street. Moreover, the predicted increases (even with mitigation) would generally be greater than those produced by the Montauk Transfer and extend over more hours. As with Montauk Transfer, these predictions are representative of conditions along the line.

Visual. Similar to Montauk Transfer the increased number of trains on the alignment, the erection of substantial security and noise barriers along the alignment, the construction of bridges to cross the alignment where existing grade crossings are eliminated would create substantial visual quality impacts.

Parks. Similar to Montauk Transfer the primary impact on parks near the alignment would result from more intrusive noise conditions and in the case of Forest Park and Glen Ridge Park, predicted increases above three dBA. These would be noticeable but not above standard for a park.

6.4.5(b) Benefits

Relief of Overcrowding. As discussed in Section 6.2.1, this option would be moderately successful at relieving the overcrowding on the E and F lines—superior to the Montauk Transfer option, comparable to the Local Connection, but inferior to the Bypass Express.

Improved Service to Underserved Areas or Population Groups. Because of new stations at Fresh Pond Road and Woodhaven Boulevard, this option would substantially improve service to currently underserved neighborhoods in Community Districts five and nine, including Ridgewood, Glendale, Middle Village, Woodhaven and Richmond Hill. Transit dependent populations in these areas, as well as in the Jamaica area would also have substantially improved service.

Accessibility. This option would provide the second greatest increase in geographic coverage of the options—substantially less than Montauk Transfer but considerably better than Bypass Express and Local Connection.

Travel Time. The Montauk options are the only ones which would produce substantial improvement in travel time between selected locations in Queens and midtown Manhattan. The Montauk/Archer option would provide substantial improvement in travel time between Woodhaven and Greater Ridgewood to midtown Manhattan. Travel time savings from Woodhaven are comparable to Montauk Transfer but are between 13 and 21 minutes faster than under the other options. Travel times from Ridgewood are between 21.5 and 31 minutes faster than all other options, the most significant time savings produced by any of the options.

Safety along the Alignment. Similar to Montauk Transfer, the erection of significant barriers to prevent crossing of the alignment would improve safety conditions along the alignment.

Visual Quality. The removal of the Elevated on Jamaica Avenue in Richmond Hill and Woodhaven would improve visual quality on that corridor and could ultimately improve the business climate on that commercial strip.

Traffic and Circulation. Demolition of the Elevated and elimination of transit stations would improve traffic circulation along Jamaica Avenue.

6.4.5(c) Equity: Who Pays?/Who Benefits?

Similar to Montauk Transfer, the costs associated with Montauk/Archer would primarily be borne by communities along the alignment, particularly in Glendale, Middle Village, Maspeth, Richmond Hill and Woodhaven. Some of the impacts could be substantial enough to affect the quality of life in these communities. However, unlike Montauk Transfer, the prime benefits provided under this option would be concentrated in those areas experiencing the negative impacts. New stations at Woodhaven Boulevard and Fresh Pond Road, would provide marked improvements in transit services to the neighborhoods experiencing the costs. Transit would be more accessible. Travel time to Manhattan would be cut substantialy. Transit dependent populations in the impacted communities would also receive improved transit service. In addition, this option would also contribute to relieving the congestion on the E and F lines and would provide substantial physical improvements, through demolition of the Jamaica Elevated.

6.5 Finances and Implementability

The foregoing sections of this chapter have focused on the DEIS analyses and evaluation of project options for their effectiveness, efficiency, and equity. This final section examines the build options in light of the financial and institutional forces that control their implementation.

6.5.1 The Metropolitan Transportation Authority

The Metropolitan Transportation Authority is an umbrella organization created in 1968 to bring coordination and flexibility to the planning operation and development of the New York City metropolitan region's complex and aging transportation systems. MTA operations extend over some 685 miles of subway, 998 miles of city bus routes, 996 miles of commuter rail and 745 miles of suburban bus routes, all of which carry approximately 5.7 million riders on a typical weekday. The subways accommodate more than 3.4 million of these passengers. In addition, daily traffic on the authority's seven bridges and two tunnels totals to over 728,000 vehicles.

Some appreciation of the scale of the MTA's rail operation can be gained through a comparison of the existing New York City rapid rail system with all the other existing rapid rail systems in the U.S. The New York subways comprise about 50 percent of all electrified rapid transit track, 67 percent of the total car fleet, and carry about 70 percent of the total annual unlinked passenger trips in the country. The New York subway system is roughly twice as large as all the other rail systems in the United States, put together.

A New York State-chartered, public benefit corporation, the MTA owns or operates its services through seven affiliated agencies: New York City Transit Authority (NYCTA); Manhattan and Bronx Surface Transit Operating Authority (MaBSTOA), a subsidiary of NYCTA; Staten Island Rapid Transit Operating Authority (SIRTOA); The Long Island Rail Road Company (LIRR); Metro-North Commuter Railroad Company (MNCR); Metropolitan Suburban Bus Authority (MSBA); and Triborough Bridge and Tunnel Authority (TBTA). MTA's primary responsibility is to obtain the maximum financial resources available for the benefit of the area's public transportation systems. It coordinates the planning and general policy direction of its agencies, approving operating and capital budgets and performance plans, carrying out the financing of capital programs, and monitoring financial and operating activities. The agencies run their transportation facilities and implement capital construction projects.

The authority inherited a system that had been in place for a long time—some of the City's rail facilities are nearing the century mark—with a history of financial failure and neglect. The replacement cost for overaged transit facilities and equipment is estimated at over $75 billion in today's dollars. Over the past 16 years, succeeding legislation has recognized the need for MTA to have the institutional and financial capability to carry out its difficult mandate with dispatch and a minimum of red tape. Most recently, the legislature created several new capital funding sources for MTA. It also removed many major procedural roadblocks, allowing MTA to commit available capital funds for new equipment, facilities and rehabilitation work in a fraction of the time previously needed.

To help fund its needs, MTA issues bonds secured by its operating revenues, by state service contracts, and by the operating surpluses of the TBTA. Other sources of capital funds include allocations from the federal, state and local government and the sale of tax benefits. The flexibility in using these funds is unique: except for those projects earmarked for specific government funding programs, the authority has a great deal of flexibility in allocating capital funds to specific projects.

However, if MTA's financing arrangements are innovative, the authority still must plan within institutional constraints. Its seven affiliated agencies are actually distinct and separate operating companies, subject to a variety of differing regulations, work rules, labor contracts, and jurisdictional arrangements. To the extent that a given subway option involves several operating agenices, it may bring into play potential institutional conflicts that must be resolved before the option can be implemented.

The following subsections examine the MTA's funding sources and needs over the next ten years, estimate the role that each of the five options would play in the authority's capital programming, and discuss institutional issues, as appropriate.

6.5.2 Current Capital Program and Funding Sources

MTA currently plans its capital needs and funding in five-year increments. The 1982-1986 Five Year Capital Program was the first of its type, containing extensive programs and substantial funding, as discussed below.

6.5.2(a) Five Year Capital Program (1982-1986)

On September 25, 1981, the Board of the MTA approved a Five Year Capital Program for 1982-1986, providing for systemwide improvements totaling $7.2 billion. Of that amount, $5.7 billion was provided for the New York City Transit Authority (NYCTA) and the Staten Island Rapid Transit Operating Authority (SIRTOA); $683 million for the Long Island Rail Road and $684 million for the Metro-North Commuter Railroad. Because of changes resulting from additional funding, application of funds available because of low bids, new areas of work and reevaluation of existing work, the original plan has been revised to include systemwide improvements totaling approximately $8.4 billion. The amount allocated to NYCTA and SIRTOA rose to $6.3 billion and the total allocation for the commuter railroads rose to approximately $2.1 billion (see Table 6-10).

TABLE 6-10

MTA FIVE YEAR CAPITAL PROGRAM, 1982-1986*
($ millions)

New York City Transit Authority	$ 6,302.6
Cars - New	1,413.4
Cars - Rebuilt/Rehab.	621.0
Buses	339.0
Passenger Stations	392.0
Track	591.8
Line Equipment	140.4
Line Structures	237.5
Signal and Comm.	377.7
Power	295.8
Shops	472.6
Yards	442.8
Depots	426.6
Service Vehicles	62.9
Security	14.9
New Routes	170.7
Emergency/Misc	303.5
Subtotal	6,302.6
SIRTOA	30.4
Subtotal	$ 6,336.0
Commuter Railroads	
Long Island Rail Road	$ 1,040.5
Metro-North	872.0
Unassigned	182.4
Subtotal	2,094.9
TOTAL	$ 8,430.9

* Approved by MTA Board, pending Capital Program Review Board approval.

The four primary goals of the capital program are:

- o reestablish, then maintain, reliable operations on the existing subways and buses;
- o ensure long term survival of the existing transit system and its safe, reliable operation at reasonable cost;
- o other improvements to the existing system;
- o advance "new routes" projects now underway.

As presented above, fully 75 percent of the total funds have been allocated to the NYCTA or SIRTOA. Highlights of the five year capital program for NYCTA and SIRTOA include:

- purchase of 1,375 new cars, now on order, and retirement of 1,724 older cars, thereby reducing the overall fleet size to 5,913 (from 6,262) and the average age to 15.7 years (from 19.5 years);
- the overhaul and rebuilding of subway cars not being replaced by new car purchases, including provision of air conditioning and substantial upgrading of the oldest series of stainless steel subway cars;
- improvements and modernization of 78 passenger stations, including control area reconstruction, noise abatement treatments, improved security and upgraded signage and lighting; and initiation of an automatic fare collection system;
- modernization of car maintenance barns and repair shops;
- expansion of existing storage yards to accommodate entire fleet (currently only 60 percent of the fleet can be stored in existing yards, the remainder stay on the mainline locations where they are easily accessible to vandals);
- improvements and upgrading of right of way, which comprise the basic infrastructure of the system. These include tracks, signals and communication equipment, tunnels, power distribution facilities and elevated structures.
- the purchase of 325 new buses/year, the installation of automatic fare collection systems on buses and the renovation of bus depots and repair shops.

Although these are the projects to date, the program is dynamic, and the funding levels and projects are expected to continue to be adjusted slightly in the next two years, as circumstances change.

6.5.2(b) Current Sources of Capital Funding

The first Five Year Capital Program has funded projects from a variety of sources as described below and summarized on Table 6-11. However, most, if not all of the program's funding sources are limited to this Five Year Program. Also discussed below, new legislation or some other action would be required to renew or expand their availability beyond 1986.

Federal Grant Funds - Funding under several federal sources is expected to total $2.6 billion for the five year 1982-1986 program. The major share of these funds comes from UMTA's "Section 3" and "Section 9" programs. Section 3, which has contributed $1.4 billion to MTA's five year budget, is a discretionary program for rail modernization or extraordinary transit costs (e.g., major capital bus projects, new rail projects). $1.1 billion were identified between 1982 and 1986; 0.3 billion were spent after 1982, but committed earlier. Section 9 funds ($1.1 billion in the MTA capital program) are allocated by UMTA according to a formula based on populations and several transit service factors. Other federal sources include UMTA Section 5 operating assistance/bus equipment acquisition funds ($53 million), trade in of Interstate Highway funds ($24 million) and the Federal Aid to Urban Systems, a program based on mileage and population ($22 million). While it is reasonable to expect these funds to continue, current legislation for the major programs expires at the end of Federal Fiscal Year 1986, concurrent with the present MTA Five Year Plan.

TABLE 6-11

MTA CAPITAL PROGRAM FUNDING, 1982-1986
(Current $ in millions)

Funding Source	1982-1986 Capital Plan Approval Pending[3]
Federal Sources[1]	
(UMTA) Section 3 Program	1,388
Section 5 Program	53
Section 9 Program	1,072
Interstate Trade In	24
Federal Aid to Urban Systems	22
State Bonds & Approp.	482
Local[2]	616
TBTA Bonds	1,076
State Service Contract	893
Lessor "Safe Harbor" Equity	500
Port Authority Bus Funds	92
Port Authority Commuter Bonds	46
Revenue & Parking Bonds	
Transit Authority	1,546
Commuter Railroads	381
Connecticut Federal Funds	43
Other	197
	8,431
Allotment by Agency	
Transit Authority/SIRTOA	6,336.0
Commuter Rail -- LIRR & Metro North and Unassigned	2,094.9

1 Reflects minimum, expected levels. The MTA is applying for higher amounts in grants.

2 Includes City funds allocated to car overhaul purposes.

3 Approved by MTA Board, pending Capital Program Review Board approval.

New York State Grant Funds - The existing Five Year Plan includes approximately $500 million in pre-1982 state general funds and bond issue appropriations. Since 1981, all state assistance has been provided through the State Service Contract (see below).

New York City Grant Funds - The existing Five Year Plan includes an annual City capital budget appropriation of $105 million for TA purposes. While the City has an obligation to fund the TA's capital needs, it has not committed to continuing the current level of support and has, in fact, proposed to reduce its post-1986 participation. In addition, much of the City support now goes for the Car Overhaul Program, which has recently been redefined as an operating budget item rather than a capital project item.

Other Local Governments - Other local governments have not provided support for the existing Five Year Plan.

Port Authority Grants for Bus Projects - The 1981 Capital Legislation authorized the Port Authority of NY & NJ to provide $200 million in bus program assistance to the state, with MTA designated for $88 million. This authorization has now been exhausted. Any additional funding would require a new authorization.

TBTA Bonds - The TBTA is authorized to issue up to $1.1 billion in bonds to support capital projects (60% for the TA, 40% for the commuter railroads). This amount will be fully committed by 1986, althugh some of the actual bond sales will occur later. Any additional funding from this source would require an increase in the $1.1 billion legislative "cap."

State Service Contracts - The 1981 Capital Legislation authorized an $80 million per year contract between the State Budget Director and the MTA for capital purposes (65% TA, 35% commuter rail). This contract is expected to support more than $800 million in direct projects and bonds, which will be fully committed by 1986. State appropriations of $80 million per year to meet debt service payments will be required to continue through SFY 2018. Any additional capital funding from this source would require a new service contract, as well as a legislative amendment.

Transit Authority Revenue Bonds - NYCTA is empowered to pledge revenues to the MTA in support of bonds in a one-time amount not to exceed $1.6 billion. Additional use of this funding source would require increases in the legislative "cap," as well as approval of the Financial Control Board, and would put further pressure on the TA's operating budget through increased debt service.

Commuter Railroad Revenue Bonds - While there is no legislated "cap" on MTA debt for commuter rail purposes, the economics of the operation serves as a limit. MTA Commuter Revenue Bonds have not yet been issued but approximately $350 million in funding for the current plan is anticipated from this source.

Port Authority Commuter Car Bonds - Under a constitutional amendment adopted in 1961, the Port Authority can sell $100 million of state-guaranteed commuter car bonds payable from system revenues. The $40 million contained in the current Five Year Plan exhausts this authorization.

Safe Harbor Leasing - Approximately $500 million in proceeds from Safe Harbor leases of buses and rail cars as permitted under the 1981 amendment to the Federal Tax Code. These provisions have been repealed and will not be available for equipment placed in service after December 31, 1987. This effectively terminates this funding source for most rolling stock contemplated after the current Five Year Plan.

Other - The balance of funding represents one-time payments, such as the Rockwell settlement or special funding for relocation of the West Side Bus Depot, and is not a continuing source.

6.5.3 Projected Capital Needs and Funding Potential

Although the next five year program has not yet been developed, work is underway to identify capital programs and assess funding sources. This section discussed the analysis to date (March 1984) of future needs and funds, not including any Queens Subway Option.

6.5.3(a) Projected Capital Needs

The MTA future needs for capital funding is broken down into three categories, as follows:

- State of Good Repair
  Given the age of MTA's transportation systems, it is not surprising that substantial capital funds need to be allocated for replacement or rehabilitation of over-aged facilities, i.e., rolling stock, problem structures, obsolete components, and deteriorated or obsolete maintenance facilities.

- Normal Replacement
  In addition to the need to bring the system to a state of good repair, funds must be given to maintaining that state once it is achieved. This includes the cycle of normal replacement of rolling stock or the major capital components of the system of buildings, stations, line structures, track, power distribution, and signals.

- New Initiatives
  These are capital projects that support either efficiencies in existing service or expanded or improved levels of service. These projects generally involve replacing system components (i.e., turnstiles, rapid transit car and bus air conditioning units, etc.) with more cost-effective equipment.

The largest portion (48 percent) of MTA's projected overall $10 billion capital need between 1987 and 1991, as indicated in Table 6-12, falls into the state of good repair category. New initiatives are estimated to require $2.8 billion or 28 percent, with the remaining $2.4 billion or 24 percent in normal replacement. Fifty-eight percent of the new initiatives are LIRR projects, with 38 percent at the NYCTA and the remaining four percent at Metro-North. Almost all (97 percent) of the normal replacement category is accounted for by the NYCTA.

TABLE 6-12

MTA SUMMARY OF TEN YEAR CAPITAL NEEDS 1984 - 1993
(in millions)

PRELIMINARY ESTIMATES*

		1987 - 1991 NEEDS **				1992 - 1993 **					
	Funded Needs 84-86	State of Good Rpr	Normal Rplcmt	New Int	Subtotal 87-91	State of Good Rpr	Normal Rplcmt	New Int	Subtotal 92-93	Subtotal 87-93	TOTALS 84-93
NYCTA/ SIRTOA	2907.1	4394.7	2341.1	1053.8	7789.5	2150.8	1145.8	515.7	3812.3	11601.9	14509.0
LIRR	303.8	22.1	77.7	1617.0	1716.8	10.8	38.0	791.0	839.8	2556.5	2860.3
MNCR	401.5	244.7	0.0	104.0	526.7	207.0	0.0	50.9	257.9	784.6	1186.1
TOTALS	3612.4	4839.4	2418.8	2774.8	10033.0	2368.6	1183.6	1357.6	4910.0	14943.0	18555.4

* As of 3/84 - does not include Queens Subway Option(s).

** 1984 dollars inflated at 6% per annum

Metro-North would reach a state of good repair by 1993, were funding available. By contrast, the NYCTA would still have four system components—tunnel lighting, signal system, portions of the track system, and about half the passenger stations—that would require post-1993 modernization to reach a state of good repair. Normal replacement needs would, of course, continue past 1993.

Within the overall context of 10-year need, as set forth on Table 6-12, the Queens Boulevard line represents a very small portion. At age 50, the line is one of the system's newest. No plans for major structural, signal or track replacements are currently contemplated. There is, however, a system-wide program identifying and correcting individual track sections that are deficient—these problems are spotted and "red tagged" for correction. To the extent that inspections reveal red tag locations on the Queens Boulevard line, repairs would be initiated.

Projects currently planned for the line include minor improvements to two passenger stations, modernization of an existing ventilation facility at the 53rd Street Tunnel, and some new welded-rail track. In addition, two projects at the Jamaica yard and barn facility affect the Queens Boulevard line, since the facility provides storage, light maintenance, and inspection for the line's subway cars. Current plans call for expansion of the yard and modernization of the barn.

6.5.3(b) Potential Funding Sources

The potential for future funding is not yet known, but a general range can be drawn based on past experience. The lower end of the range assumes that current funding sources, other than clear one-time opportunities, continue at about current levels, allowing for inflation; the higher end of the range posits a vigorous and innovative attempt to expand existing sources and find new opportunities. The result would be a level of funding ranging from $5 to $10 billion for the five years from 1986 through 1991. The assumptions, reasoning and amounts for each source are described below and summarized in Table 6-13.

Federal Funds - Based on past experience (but no federal commitment), the present federal program level is likely to be extended beyond 1986 and expanded somewhat, as well. This expansion would involve authorizing Section 3 grants at a level supportable by gas tax receipts (approximately $1.3 billion vs. the presently authorized $1.1 billion) and providing some growth into the Section 9 program (the present authorizations increase by six or seven percent per year). On this basis, and assuming (1) full funding and (2) a continuing MTA share equal to its current level, the second Five Year Plan could include an average of $700 million a year in federal funds. On the current basis these would require approximately $200 million in local match to be derived from the other sources discussed below.

However, this scenario assumes no real growth beyond inflation. In a more optimistic future scenario, MTA would actively seek an increase in the level of federal participation. For example, a 50 percent increase could generate another $1.25 billion over the second plan period. This would require a change in federal budget policy to give greater priority to transit or to give greater priority to rail modernization within the existing transit program. Alterna-

TABLE 6-13

POTENTIAL MTA CAPITAL PROGRAM FUNDING 1987-1991
(Current $ in millions)

Funding Source		Potential Estimated 1987-1991 at Present Level of Effort	Potential Estimated 1987-1991 at Expanded Level of Effort
Federal (UMTA)		3,500	3,500 - 4,800
Federal (Interstate)		0	0 - 700
State Bonds & Approp.		0	0
Local*		525 - 750	750 - 1,000
TBTA Bonds		450	450 - 1,200
State Service Contract		425 - 450	450 - 800
Lessor "Safe Harbor" Equity		0	0 - 200
Port Authority Bus Funds		88 - 120	120 - 200
Port Authority Commuter Bonds		0	0
Revenue & Parking Bonds			
Transit Authority		0	500 - 1,800
Commuter Railroads		0	140 - 510
Connecticut Federal Funds		0	0
Other		0	100 - 250
		4,988 - 5,270	6,010 - 10,460
		Average 5,129	Average 8,735
Allotment by Agency			
Transit Authority/	MIN	3,854	4,703
SIRTOA	AVG	3,991	6,807
	MAX	4,128	8,911
Commuter Rail --	MIN	1,134	1,307
LIRR & Metro	AVG	1,138	1,928
North	MAX	1,142	2,549

* New York City allocations primarily; upper end of range could include contributions from other localities.

tively, as was proposed earlier but rejected by OMB, an ability to leverage MTA's UMTA formula grants in the fashion of the State Service Contract would generate greater availability in the near term (albeit at the expense of future commitments). If, for example, MTA could leverage half of the anticipated Section 9 capital program, this would produce an additional $1.3 billion in capital during the 1987-1991 period.

State Funds - Future state participation is expected to be through the State Service Contract program (SSC) rather than by bond issue or annual appropriations. As noted above, this funding now requires continuing state appropriations of $80 million per year through SFY 2018 to support debt service. Under the contract the state will reduce this outlay by some $8 million in various fund earnings to a net of $72 million. Additional capital funding would require new state authorization, in competition with other state needs, including expanded support for operations. However, the overall state general fund budget will have grown by approximately 44 percent between the first and the sixth year of the SSC program. Thus, it might be appropriate for MTA to request the state to re-scale its $80 million annual commitment to $115 million. This increase in annual support, plus a decision to redirect reserve fund earnings to the MTA's benefit could generate approximately $425 to 450 in additional capital over the second Five Year Plan period.

In addition to this "level-effort" expansion, MTA could seek an expanded state role, although this would be in conflict with reliance on the state for increased operating support. Alternatively, it might be possible to transfer some present state operating funding to the service contract, with a consequent impact on the Authority's operating budgets.

City and Local Funds - Given the importance of transit service to the City economy and the City's obligation to meet NYCTA capital needs, it does not seem appropriate to plan for a reduced City commitment level. As a planning target, MTA would seek continuation of the present $105 million per year, with the assumption that it should go towards true capital needs and not operating budget items. With an allowance for escalation, this amount could be raised to $140 to 150 million. As in the case of the state, there is probably limited potential for expanding local support for the capital program in light of competing priorities.

However, in the more optimistic scenario, it is possible that the City would consider expanded support in light of its improving financial health and the critical need for transit service as a support to the City's economy. The support would be available through use of the MAC reserves. This potential should be tapped, if possible, especially if the alternative is increased operating budget pressure through use of revenue bonds.

Similarly, MTA could seek other local support for some aspects of the railroad program, such as electrification or station projects, in light of the significant benefits to local real estate values brought about by rail services.

Port Authority - While the Port Authority may have alternative proposals as to the appropriate uses for its surplus revenue, it is likely that the PA's financial condition could support renewal of the $88 million one-time bus program level contained in the current plan. With an allowance for escalation, this would come to $110 to 120 million. The MTA would have to argue successfully to the legislature as to its appropriateness for inclusion in the Port Authority's plans for economic development.

✓ TBTA Bonds - The TBTA debt limit has been calculated based on a borrowing capacity under existing covenants with a $1.00 toll level. While some of this capacity has been eroded by high interest rates and increased operating costs, TBTA's current tolls of $1.50 can support additional debt service. Based on current forecasts, TBTA's debt limit could be raised to $1.55 billion within the present Resolution, thus creating an additional $450 million in funding for a second Five Year Plan.

The additional funding potential from this source noted above assumes no toll increases. In the more optimistic scenario, depending on Board policy with respect to toll increases, the potential availability could expand. For example, if a 25¢ increase were assumed to occur every two years, an additional $1.2 above the current $1.1 billion cap billion could be raised from TBTA Bonds through 1991.

✓ Revenue Bonds - Given the impact that revenue bonds will have on the operating budget, additional funding on this basis beyond the current program of $1.6 billion for TA and $400 million for the commuter railroads would be a major policy decision. However, in the absence of other sources, it would be appropriate to consider revenue financing as an alternative to not meeting capital needs. In addition, a strong case can be made for revenue financing where projects have potential "return on investment" in terms of additional revenues or productivity savings on the expense side.

Given that this is a policy decision, it is difficult to put a precise number on this capital source, for the decision might be to hold the amount to zero. However, in terms of a range, it would be possible to issue, over time, an additional $0.5 billion in NYCTA revenue bonds without increasing the maximum impact on the NYCTA's operating budget above the $245 million annual debt service that had been projected for 1999 at the time the first revenue bonds were sold. This increase is a function of lower-than-expected interest and inflation rates, i.e., the $245 million now gives a larger bonding capacity. At the upper end of the range, the NYCTA bond resolution would permit issuance of up to $1.8 billion additional bonds for capital projects based on the current resolution tests.

Direct Operating Revenue - As an alternative to Revenue Bonds in the optimistic scenario, it is possible to use operating revenue directly for capital projects. Obviously this also affects fare levels, but on a current, as opposed to future, basis.

Safe Harbor Leasing - In the optimistic scenario, MTA could seek renewal of the safe harbor lease provisions. However, because of the limited amount of new rolling stock purchase planned during the 1987-1991 time period (without the Queens Subway Options) the potential here would be in the range of $200 to 250 million.

Trade-In of Interstate Highway Funds - Although current policy supports the construction of Westway, the legal option exists to effect a trade-in under the provisions of the Federal Highway program. The potential trade-in funding available (no longer subject to escalation under the current provisions) would be approximately $1.3 billion, with a draw-down schedule that would be somewhat longer than the next Five Year Plan period. Use of funds for transit would be a trade-off with uses for substitute street, highway and bridge projects and would be fully subject to the Congressional appropriations process and partly subject to Administration direction. Realistically, even in an optimistic scenario, it would be reasonable to program no more than $500 to 700 million as an upper limit from this source if it were to be available at all during the plan period.

Revenue from Real Estate Development - MTA is now exploring the potential for generating capital revenues from the development of key properties, such as the East Side Airlines Terminal, the Coliseum site and the Caemmerer Yard air rights. To the extent that these properties have values that can be captured, the timing and amount is uncertain and depends on negotiations. However, a figure in the range of $100 to 250 million for the second Five Year Plan is a reasonable estimate.

Revenues will also be augmented by contributions for station improvements from private developers, either in exchange for a floor area bonus granted by the City or to mitigate an environmental impact.

Summary - In summary, there is significant potential for renewed use of the funding sources available in the first Five Year Plan, assuming favorable action by the respective agencies and legislatures at essentially a maintenance of current effort levels. There are risks to be evaluated, such as shortfalls in federal appropriations vs authorization, interest rate environment, competitive State and City priorities, etc. However, it is likely that these existing sources could generate some $5 to $5.3 billion over the 1987-1991 time period. The more optimistic scenario could generate another $1 to 5 billion. In this case, though, the risks would be greater, and the likelihood of reaching top funding levels is low.

As can be seen by comparing Tables 6-12 and 6-13, the MTA can cover its 1987-1991 estimated needs of $10 billion only in the unlikely event that all of the funding sources can be tapped to their maximum capacity. Clearly, some needs will not be met, and others will not see resolution until some time after 1991.

6.5.4 Project Funding and Magnitude of Investment

The total capital costs (in 1983 dollars) of each of the four Queens Subway options are presented in section 2.3 of this DEIS. In order to assess the effect that these costs would have on the MTA's capital funding, it is necessary to express them in the dollars of the years in which they would actually be spent. As seen on Table 6-14, these costs for a given year could range from less than a million dollars to half a billion, depending on the option and the year of expenditure.

TABLE 6-14

ESTIMATED ANNUAL CAPITAL EXPENDITURES OF QUEENS SUBWAY OPTIONS

(millions of current dollars)

	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
1985	neg.	2.2	1.1	1.1
1986	1.2	4.8	2.4	2.4
Total 1982-1986	1.2	7.0	3.5	3.5
1987	5.0	3.8	3.8	2.5
1988	5.3	9.4	8.0	5.3
1989	8.5	12.8	9.9	9.9
1990	43.6	13.5	19.5	12.0
1991	97.2	39.9	78.1	25.5
Total 1987-1991	159.6	79.4	119.3	55.2
1992	170.6	91.2	133.5	57.4
1993	28.6	164.7	229.2	100.3
1994		176.5	311.3	148.1
1995		243.5	72.4	299.8
1996		418.0		422.3
Total 1992-1996	199.2	1,093.9	746.4	1,027.9
1997		567.5		88.2
1998		155.8		
Total 1997-2001	--	723.3	--	88.2
TOTAL	360.0	1,903.6	869.2	1,174.8

Ideally, costs for the selected Queens subway option would be substantially underwritten by the Federal (UMTA) New Starts program. The MTA would compete for its share under the program and, if successful, could receive up to 75 percent of the project's capital costs. However, UMTA's goal for New Starts and major extensions is a 50/50 federal/local contributions, thus half the costs would come out of MTA's capital program. Table 6-15 summarizes, for each of the next four five-year capital programs: the expected local share of funding needed for each option, assuming 50 percent federal funding; the range of estimated total capital funding required for each five-year period; and the capital cost of each option expressed as a percentage of each five-year capital program.

As seen on Table 6-15, the effect of the Queens options on the five-year programs varies depending on the option. The Local Connection would use up 0.8 to 1.6 percent of the 1987-1991 funds (assuming 50 percent local funding), a

TABLE 6-15

LOCAL SHARE OF PROJECT CAPITAL COSTS AS A PORTION OF OVERALL CAPITAL FUNDING

Five Year Program	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
1982 - 1986 Project Costs[(a)]	0.6	3.5	1.8	1.8
Percent of Total Funding[(b)]	neg.	0.04	0.02	0.02
1987 - 1991 Project Costs[(a)]	79.8	39.7	59.7	27.6
Percent of Total Funding[(c)]	0.8-1.6	0.4-0.8	0.6-1.2	0.3-0.6
1992 - 1996 Project Costs[(a)]	99.6	547.0	373.2	514.0
Percent of Total Funding[(d)]	0.8-1.5	4.1-8.2	2.8-5.6	3.8-7.7
1997 - 2001 Project Costs[(a)]	0	361.7	0	44.1
Percent of Total Funding[(e)]	0	2.0-4.0	0	0.3-0.5

(a) 50 percent of costs shown in Table 6-14, in millions of current dollars.
(b) $8.5 billion, see Table 6-10.
(c) $5 to 10 billion range estimated in Table 6-13.
(d) $6.7 to 13.4 billion (1987-1991 range inflated to current dollars at 6 percent/year).
(e) $9.0 to 17.9 billion (1987-1991 range inflated to current dollars at 6 percent/year).

range double that of the Queens Bypass Express (0.4 to 0.8 percent in the same period). However, the Bypass, which would begin active construction later and extend it longer, would spend 4.1 to 8.2 percent of the next five years' budget (1992-1996), and would extend into the 1997-2001 time period. Expenditures for the Montauk options would also vary, with the Transfer's effect felt earlier than that of Montauk/Archer.

In the 1982-1986 five-year program, none of the Queens Options would have a significant impact on the total capital funding program, with the Queens Bypass Express requiring only 0.04 percent of the program as the maximum case. In the 1987-1991 period, the Local Connection would consititute the maximum case share at 1.6 percent, still a relatively small impact. Thus, for the next seven years, the capital needs for any of the Queens Subway Options would be a small portion of the overall MTA capital program. For the 1992-1996 five year program, major construction activity would be taking place on all options, with the most significant share amounting to about eight percent for the Queens Bypass Express and the Montauk/Archer options, assuming 50 percent federal funding.

Table 6-15 shows that the Queens Subway Options would constitute a small to moderate portion of the total capital funding which will be raised by the MTA in its current and succeeding five-year programs. Nonetheless, any capital funds allocated for the local share of the cost of building one of the Queens Subway Options would be a reduction in funding available for other identified needs and this could well result in deferral of other projects.

6.5.5 Operating Income/Deficit

The MTA must have an approved operating budget for each agency by January 1 of each year. This budget is based upon estimates of fare revenues and operating costs. The difference between fare revenues and costs is the anticipated shortfall or deficit. The budget approved by the MTA board cannot have a deficit between income and expenses. Therefore, after calculating the expected deficit, and reviewing potential additional sources of funding (such as additional state assistance) to augment projected income, the remaining deficit is eliminated either through service reductions aimed at lowering operating costs or by increasing the fare paid by the passengers.

The use and sources of MTA operating funds are detailed in Table 6-16. As presented in the table, total 1983 operating costs equalled $3,172,700,000 of this amount, 70.1 percent was spent by NYCTA and 27.7 percent by the commuter railroads. 1983 revenues from fares accounted for an estimated 43 percent of the total MTA operating costs producing a shortfall of approximately $1.78 billion. This shortfall was closed through use of a variety of funding sources which included:

- <u>Triborough Bridge and Tunnel Authority (TBTA) Surplus</u> - An estimated 6.7 percent of total operating funds are covered through use of TBTA bridge and tunnel toll revenues remaining after the payment of TBTA operating expenses and obligatory bond payments.

TABLE 6-16

1983 USE AND SOURCES OF MTA OPERATING FUNDS
(DOLLARS IN MILLIONS)

Use of Operating Funds	1983 Amount	1983 %
NYCTA	$2,223.7	70.1%
MSBA 36.9	1.2	
Commuter Railroads	879.3	27.7
MTA Headquarters	32.8	1.0
Total	3,172.7	100.0%
Sources of Operating Funds		
Fares	$1,396.2	43.0%
TBTA Surplus	217.6	6.7
Government Operating Assistance		
State Operating Assistance	181.5	5.6
Regional dedicated sources	544.5	16.8
Federal		
ConRail Passenger Transit Grant	57.0	1.75
UMTA Sec.5/Sec.9	158.3	4.85
Local/Other	490.3	15.1
Miscellaneous	201.0	6.2
Total	$3,246.4	100.0%

- State Operating Assistance - Approximately 5.6 percent of total MTA operating funds in fiscal year 1983 were derived by operating subsidies provided directly through the annual New York State operating budget.

- Regional Dedicated Sources - An estimated 16.8 percent of total operating funds were derived from regional dedicated sources, including taxes on gross receipts of petroleum sales within the state, a 0.25 percent sales tax within the MTA service region, long-line taxes and a corporate franchise surcharge tax.

- ConRail Passenger Transition Grant - Approximately 1.75 percent of the MTA's 1983 FY operating funds were provided by this one-time federal grant designed to assist local operators during the transition of control from Conrail commuter rail passenger operations to the local transit operators. For MTA, this involved assumption of Metro-North commuter railroad operations.

- UMTA Operating Assistance - Approximately 4.85 percent of total operating funds are derived from UMTA through Sections 5 and 9. These are formula-allocated Federal Funds which UMTA expects to be eliminated after FY 1986.

- o <u>Local and Other</u> - This source of funds includes general revenue funds provided by New York City and the suburban counties and municipalities for the maintenance of rapid transit and commuter rail stations. This accounted for 15.1 percent of MTA's FY 1983 operating funds.

- o <u>Miscellaneous</u> - An additional 6.2 percent of the operating funds are derived from a variety of other sources including rental income from concessions, Connecticut Department of Transportation contributions for the operation of the New Haven Commuter Rail Line and income from interest bearing bank accounts.

To determine the change in operating deficit, the incremental annual riders attracted to each option were tabulated and multiplied by the average fare to determine annual revenue. Ridership and revenue estimates are presented in Chapter 4. Annual operating costs were calculated for each option and are discussed in Chapter 2.4. The incremental operating deficit (or profit) is found by subtracting the annual incremental operating cost from the incemental annual operating revenue. These calculations were performed for each option for each year from 1986 to 2002. The operating costs were escalated by five percent annually to account for inflation (from Charles River Associates, Inc., <u>NYCTA Revenue Feasibility Study: Economic Analyses and Projections</u>, October 1, 1982; Appendix A.11 shows the result of a seven percent rate of increase in operating cost). Revenues were similarly inflated by 5.4 percent annually, the projected increase in the Consumer Price Index. The incremental annual operating income/deficits were calculated separately for NYCTA subway, LIRR, NYCTA bus, and private bus.

Table 6-17 presents a cumulative summary of the operating deficits for each option for the entire 17 year period from 1986 to 2002 and compares their effect on the system's operating deficit. (Because the income/deficits fluctuate over time between profit and deficit for each option, no average annual deficit was calculated.) One can see that for LIRR and NYCTA bus service, the annual operating deficit is reduced in several cases. These reductions result from several factors including: an overall increase in forecasted ridership and increases in ridership on existing routes where few or no new trains or buses are added. This is true for the No Additional Construction and Local Connection options. The most significant increases in operating deficit are seen in the Montauk Transfer option, which would expand LIRR operations and shift subway riders. The LIRR deficit for the Montauk/Archer option includes the cost of right-of-way maintenance and operation for the Montauk Branch.

Overall, the No Additional Construction option shows almost no cumulative impact on the MTA operating deficit. While the other options vary considerably, they, too, have little incremental effect on the deficit, never reaching more than a 1.9 percent increase.

TABLE 6-17

QUEENS SUBWAY OPTIONS STUDY - PHASE II
CUMULATIVE IMPACT ON ANNUAL OPERATING INCOME/DEFICIT*
1986 - 2002

(in $ millions**)

	No Additional Construction	Local Connection	Queens Bypass Express	Montauk Transfer	Montauk/ Archer
Incremental Income/Deficit 1986-2002					
NYCTA subway	- 106.0	- 227.5	- 342.0	- 348.4	- 222.9
LIRR	19.9	17.4	- 48.9	- 41.3	- 63.7
NYCTA surface (bus)	77.3	82.4	88.2	- 57.5	49.0
Total MTA	- 8.8	- 127.7	- 302.7	- 447.2	- 237.6
Private Bus	33.1	37.5	34.4	29.1	3.7
Total	24.3	- 90.2	- 268.3	- 418.1	- 233.9
MTA Systemwide Operating Deficit 1986-2002					
With Options	-22,857	-22,976	-23,151	-23,295	-23,086
Build Options $ Change from No Additional Construction		-119	-294	-438	-229
Build Options % Change from No Additional Construction		0.5%	1.3%	1.9%	1.0%

* Positive numbers represent decreases in deficit, minus signs indicate increases in deficit.

** Current year dollars, revenue inflation factor = 1.054, cost inflation = 1.05.

6.5.6 Institutional Matters

Regulatory and labor issues can have a significant impact on the ability of the MTA to implement service where such service has no recognizable precedent. These issues are addressed here, specifically with respect to the Montauk/Archer option. All of the other options involve distinct demarkation of services and facilities among the various divisions of the NYCTA and LIRR. Except for Montauk/Archer, the options do not differ from current operating practices for each operating agency and involve only extension of service along conventional lines.

In the Montauk/Archer Avenue subway connection, the Transit Authority would operate standard subway cars over Long Island Rail Road right-of-way, while the trackage would continue to be maintained and freight service operated by LIRR personnel. In determining the operation of this option, the question of institutional concerns must be taken into consideration.

Institutional items as defined in the study were federal regulations and labor practices. Two federal agencies with regulatory powers affecting the Montauk/Archer option were identified: the Federal Railroad Administration (FRA) and the Interstate Commerce Commission (ICC). The FRA regulations deal with the equipment requirements of operating freight and passenger service over the same track. ICC regulations involve the status of transit properties which operate or assist in the operation of freight. Typically these regulations include requirements for inspection of equipment, and the status of transit personnel.

6.5.6(a) Federal Railroad Administration (FRA)

The Federal Railroad Administration regulates freight and passenger railroads in the area of rail safety, particularly car structural specifications, equipment and inspections. FRA regulations do not apply to transit systems, such as the New York subway, which do not interchange traffic with freight and passenger railroads.

NYCTA subway cars do not meet the FRA standards that would permit them to be operated on the LIRR. Equipment such as handholds, and uncoupling levers may need to be either added or relocated to comply with FRA regulations. In addition, the car structure would require modification to achieve higher impact strength on the ends of the cars, called "buffing strength." A dedicated fleet of subway cars modified to run on the Montauk Branch would be required, adding to the cost of the option. Other TA equipment would not be permitted to operate on the line, reducing flexibility and increasing the operating difficulty. The alternative to acquisition of a dedicated car fleet is to seek an exemption from the FRA. In discussions with representatives of the FRA, it was learned that an exemption would be possible if a plan could be developed to fully segregate LIRR freight and NYCTA passenger operations from each other, and have systems in place that could insure this separation. The freight plan and track configuration for the Montauk/Archer Avenue subway option was developed to meet this criterion. However, the development of the plan does not insure the granting of an exemption. A formal process would have to be followed, resulting in a public hearing held by FRA on the possible exemption. This process would require the detailing of the plan, including the mechanical safeguards to be employed. The position of the operating agencies and interested parties, such as labor and the public, would be part of the deliberations by FRA before an exemption would be given. This process precludes a decision prior to the conclusion of this AA/DEIS study. For purposes of this study, however, it is assumed that such an exemption would be sought and granted.

6.5.6(b) Interstate Commerce Commission (ICC)

The ICC has responsibility for regulating freight activities involving interstate traffic. Since the Long Island Rail Road is an interstate freight carrier, ICC currently has regulatory authority over the conduct of the operation. Primarily, for this study, applicable regulations relate to personnel and inspection. Members of the LIRR are not subject to state employee regulations, but rather are covered by the Federal Railway Act. This act exempts the various unions from provisions of the Taylor Law, and entitles them to fringe benefits different from other state employees.

ICC jurisdiction extends to railroad personnel who are actively involved in the movement or assist the movement of interstate commerce (freight cars). If the NYCTA were to acquire the right-of-way of the Montauk Branch between Long Island City and Jamaica Avenue, it would have to maintain the freight service. Under these circumstances, applicable ICC regulations could be extended to the entire NYCTA system with substantial adverse cost implications. To avoid this situation, it is proposed as part of the Montauk/Archer option that the TA would not own, operate, or maintain the right-of-way, but would have trackage rights over it, granted by LIRR. Under this plan LIRR would control the right-of-way, and NYCTA would not be governed by the ICC. This then introduces the possibility of jurisdictional disputes among the various LIRR and NYCTA labor unions in the Montauk/Archer Avenue subway option. It is the only option which involves both LIRR and TA personnel operating over the same trackage.

These union jurisdictional problems arise as a result of collective bargaining agreements which were negotiated with unions on the Transit Authority and Long Island Rail Road. Most notably affected would be the following unions: Transport Workers Union of America (Transit Authority), Brotherhood of Locomotive Engineers (LIRR), United Transportation Union (LIRR), Brotherhood of Railway, Airline and Steamship Clerks (LIRR), International Brotherhood of Teamsters (LIRR), and American Railway Supervisors Association (LIRR).

These organizations have contractual guarantees to perform work on the equipment or property involved in this option, either by express language of their collective barginning agreements or by historical practice. On the basis of these contractual provisions, both Transit Authority Train Operators and LIRR Engineers could be expected to claim the right to operate the equipment involved in the Montauk-Archer Avenue subway connection. Any resolution of such a dispute would involve protracted negotiations, and could have significant cost implications beyond those examined in this study. The other unions referred to have similar claims to perform work related to the movement of trains or the maintenance of the equipment or the property.

QUEENS SUBWAY
OPTIONS STUDY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

A.0 APPENDICES

Appendix A.1 Community Involvement Program (CIP) Summary

Process

During the course of the Alternatives Analysis/Draft Environmental Impact Study, a comprehensive program of community involvement was carried out to supplement and support the technical work of the study. The objective of the CIP has been to provide a continuous flow of information on the study and its individual tasks as it became available and to provide feedback between the MTA, its consultants and community, business, labor and government representatives in order to facilitate the selection of the most beneficial alternative. The program was developed at the outset of the study with the first meeting held in August 1982 (prior to consultant selection) at Queens Borough Hall to review the scope of work. Subsequent to that initial meeting, the CIP has involved the following major components:

- Working Group. After the scoping meeting, it was decided to establish a formal and broad-based working group consisting of approximately 35 community representatives, including those from the local community boards, civic and block associations and elected officials. The purpose of the working group is to provide an on-going mechanism to review and provide reactions to the work of the study as it progressed. The working group has met seven times at regular intervals during the course of the study and will meet at least one more time to review the DEIS.

- Technical Advisory Committee (TAC). A second group, consisting of 15 representatives from metropolitan area transit and planning agencies was formed to provide additional technical feedback to the MTA based on information similiar to that provided to the Working Group.

- Community Meetings. During the course of the study, presentations were made to various community, business and labor groups throughout the borough to disseminate project information and solicit grass-roots community input. By the end of the study a total of approximately 5,500 people had attended approximately 65 community meetings. Over 70 percent of these meetings were attended by people in the Community Board 5 area.

- Newsletters. The MTA staff produced a series of five newsletters on the study. Over 25,000 newsletters and 5,000 Question and Answer Sheets have been distributed City-wide to date. Topics covered in the newsletters included a description of the alternatives, service options and required property acquisitions. A mailing list of elected officials, community, business and labor representatives and any other individuals expressing interest in the study has been maintained and now exceeds 3,000 names.

- Community Contacts. The Community Involvement Program maintained a monthly log, including a record of the phone calls and correspondence regarding the study.

The community involvement program is planned to continue through circulation and review of the Draft EIS and the formal public hearing.

Issues Raised

Many issues were raised through the community involvement program which have been addressed in the Environmental Impact Statement. Predominant issues raised at the various working groups and community meetings included:

1. Impacts on various local quality of life issues beyond improved transit service. These include noise and vibration impacts, community character, safety and crime, property values and the need to measure these local impacts against system-wide transit benefits. Concerns were greatest in communities in the Community Board 5 area, particularly in Glendale and Middle Village.

2. Disruption caused by construction activity, including that caused by the elimination of grade crossings and construction of new crossings along the Montauk Branch.

3. Displacement of residential and commercial/industrial uses.

4. Safety and utilization of pedestrian passageways.

5. The impacts of increased numbers of trains on Forest Park.

6. Improved service to Southeast Queens, originally part of the TA new-routes program, and the fare structure adopted for the Montauk Transfer alternative serving this area.

7. Impacts on existing freight operations along the Montauk Branch.

8. Costs of providing the new services versus improving service on existing lines.

9. Inconvenience caused by terminating through service on the GG line from Brooklyn to Queens.

Appendix A.2 List of DEIS Recipients

This Draft Environmental Impact Statement is being circulated to various federal, state, and local agencies and to interested organizations in accordance with applicable regulations and guidelines. This section provides a list of those agencies, organizations, and public officials who received copies of the DEIS for review and comments.

Availability of DEIS for Review

Copies of the DEIS can be inspected by any interested party in the offices of:

- Urban Mass Transportation Administration
  26 Federal Plaza, Suite 14-110
  New York, N.Y. 10278

- Metropolitan Transportation Authority
  347 Madison Avenue
  New York, New York 10017
  Library - 10th Floor

- New York Metropolitan Transportation Council
  One World Trade Center, 82nd Floor
  New York, N.Y. 10048

- New York City Department of City Planning
  Queens Office
  29-27 41st Avenue
  Long Island City, N.Y.

- Queens Borough President's Office
  Community Board Room
  120-55 Queens Boulevard
  Kew Gardens, N.Y. 11424

- Urban Mass Transportation Administration
  UGM-22 400 7th Street, S.W.
  Washington, D.C. 20590

- Queens Borough Public Library Branches
  - Central Library 89-11 Merrick Blvd., Jamaica
  - Astoria 14-01 Astoria Blvd., Long Island CitY
  - Bdway 40-20 Bdway., Long Island City
  - Cambria Heights 220-20 Linden Blvd.
  - Elmhurst 86-01 Bdway
  - Forest Hills 108-19 71st Ave.
  - Glendale 78-60 73 Pl.
  - Hollis 202-05 Hillside Ave.
  - Jackson Heights 35-51 81st St.
  - Laurelton 134-26 225th St.
  - Lefrak City 98-25 Horace Harding Expwy
  - Maspeth 69-70 Grand Ave.

Middle Village 75-30 Metropolitan Ave.
Queens Village 94-11 217th St.
Queensbridge 10-43 41st Ave., Long Island City
Ravenswood 35-32 21st St., Long Island City
Rego Park 91-41 63 Dr.
Richmond Hill 118-14 Hillside Ave.
Ridgewood 20-12 Madison St.
Rochdale Village 169-09 137 Ave., Jamaica
Rosedale 144-20 243rd St.
South Hollis 204-01 Hollis Ave.
St. Albans 191-05 Linden Blvd.
South Jamaica 110-36 New York Blvd.
Steinway 21-45 31st St., Long Island City
Sunnyside 43-06 Greenpoint Ave., Long Island City
Woodhaven 85-41 Forest Pkwy.
Woodside 54-22 Skillman Ave.
New York Public Library 5th Ave. 42nd St. Manhattan

- New York Municipal Reference and Research Center
  31 Chamber St. Rm 112 Manhattan

Circulation of DEIS for Comments

The DEIS is being circulated for comments to the following federal, state, regional and local representatives, agencies, and organizations:

1. Federal Agencies

U.S. Department of Transportation, Washington and Regional offices
Urban Mass Transportation Administration
Federal Highway Administration
Federal Aviation Administration
Federal Railroad Administration
U.S. Environmental Protection Agency, Washington and Regional offices
U.S. Department of Energy
U.S. Department of the Interior
Interstate Commerce Commission
Advisory Council on Historic Preservation
Regional Administrator, U.S. Department of Housing and Urban Development
District Engineer, U.S. Army Corps of Engineers
United States Coast Guard
Federal Emergency Management Administration

2. State Agencies

Office of the Governor - New York State
New York State Department of Transportation
New York State Department of Environmental Conservation
Chairman of the State Board for Historic Preservation
A-95 State Clearinghouse

3. Local and Regional Agencies

Office of the Nassau County Executive
Office of the Suffolk County Executive
New York City Department of Parks and Recreation
New York City Landmarks Preservation Commission
New York City Board of Education
New York City Department of Transportation
Office of the Manhattan Borough President
Office of the Queens Borough President
Office of the Brooklyn Borough President
Office of the Mayor - New York City
New York City Police Department
New York City Fire Department
New York City Department of Sanitation
New York City Department of Environmental Protection
New York City Bureau of Franchises
New York Metropolitan Transportation Council
Metropolitan Transportation Authority constituent agencies;
- New York City Transit Authority
- Long Island Rail Road
- Metropolitan Surburban Bus Authority

4. Elected Officials

U.S. Senators
- Daniel Patrick Moynihan 733 Third Ave., NYC, NY 10017
- Alfonse D'Amato 1 Penn Plaza, Rm. 1635., NY, NY 10007

U.S. Congress Members
- Geraldine Ferraro 65-31 Grand Ave., Maspeth, NY 11378
- James H. Scheuer 137-08 Northern Blvd., Flushing, NY 11354
- Joseph P. Addabbo 96-11 101 Ave., Ozone Park, NY 11416
- Gary Ackerman 118-35 Queens Blvd., Forest Hills, NY 11375

New York State Officials
- Mario M. Cuomo, Governor
- Alfred B. Del Bello, Lt. Governor
- Robert Abrams, Attorney General
- Edward V. Regan, Comptroller

New York City Officials
- Edward I. Koch, Mayor, City Hall
- Carol Bellamy, President of the City Council, City Hall
- Harrison J. Goldin, Comptroller, Municipal Building
- Donald R. Manes, Queens Borough President, Queens Borough Hall
- Andrew Stein, Manhattan Borough President, Municipal Building

State Senators
- Carol Berman 2 Lord Ave., Lawrence, NY 11559
- Jeremy Weinstein 82-17 153 Ave., Howard Beach, NY 11414
- Frank Padavan 224-50 Braddock Ave., Queens Village, NY 11428
- Emanuel R. Gold 73-15 Yellowstone Blvd., Forest Hills, NY 11375
- Martin J. Knorr 68-30 Myrtle Ave., Glendale, NY 11385
- George Onorato 28-17 Astoria Blvd., Long Island City, NY 11102
- Leonard Stavisky 142-04 Bayside Ave., Flushing NY 11354
- Andrew Jenkins 109-43 Farmers Blvd., St. Albans, NY 11412

State Assembly

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Edward Abramson 82-17 153 Ave., Howard Beach, NY 11414
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Denis J. Butler 43-08 30 Ave., LIC, NY 11103
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Alton R. Waldon 115-03 Cambria Heights, NY
Helen M. Marshall 76-15 35th Ave., Jackson Heights, NY
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Morton Povman 108-18 Queens Blvd., Forest Hills, NY 11375
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Peter E. Vallone 22-45 31 St., Astoria, NY 11105
Thomas J. Manton 60-14 Roosevelt Ave., Woodside, NY 11377
Arthur J. Katzman 118-21 Queens Blvd., Forest Hills, NY 11375
Joseph F. Lisa 50-07 108th St., Corona, NY 11368

5. Schools

Queens College, Flushing
St. John's University, Jamaica
York College, Jamaica
LaGuardia Community College, Long Island City
Queensborough Community College, Bayside
Long Island City H.S.
Springfield Gardens H.S.
Christ the King H.S., Middle Village
Jamaica H. S.,
P.S. 153 Maspeth
P.S. 119, Glendale
Sacred Heart, Glendale

6. All Community Boards in Study Area

7. Other Organizations

Transport Workers Union - Local 100
Richmond Hill Block Association
Glendale Taxpaxers' Association
Long Island City Business Development Corporation
Long Island Freight Users Association
Glendale Chamber of Commerce
Permanent Citizens Advisory Committee to the MTA
Queens Coalition Against the Proposed Montauk Options
Maspeth Metro Civic Association

Elmhurst Chamber of Commerce
Jackson Heights Community Development Corporation
Sunnyside Gardens Community Corporation
Woodside on the Move
Queens Center
Citizens Organized for Overall Progress, St. Albans
Adults and Youth for a Better Baisley Park
Your Block Association, Elmhurst
Glen Oaks Tenants Organization
Queens Subway Riders Alliance
Sierra Club
Forest Hills Community House
Greater Jamaica Development Corporation
Regional Plan Association
Forest Park Crescents Cooperative
New York Chamber of Commerce and Industry
Ridgewood Property Owners & Civic Association
97th St. Block Association, Elmhurst-Corona
Better Community Civic Association, Jamaica
Newtown Civic Association, Elmhurst
West Jamaica Community Association
Jamaica Hill Community Association
Associated Organizations of Ridgewood, Maspeth, Glendale, Middle Village, Inc.
Parkside Civic Association, Queens Village
113th Precinct Community Council, St. Albans
Concerned Neighbors of St. Albans
Electric Railroaders Association

Appendix A.3 Preparers of the DEIS

This Alternative Analysis/Draft Environmental Impact Statement was prepared by the Metropolitan Transportation Authority, State of New York and the U.S. Urban Mass Transportation Administration.

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Appendix A.5 <u>List Of Technical Reports And Working Papers</u>

During the course of the Queens Subway Options Study, a number of Working Papers (WP) were prepared. These provide a substantial amount of the detailed, technical analyses, summarized in the DEIS. These Working Papers are available for public inspection at the MTA executive offices located at 347 Madison Avenue, New York, N.Y.

WP1	CALIBRATION - TRAVEL DEMAND ANALYSIS
WP2	TRAVEL FORECAST - TRAVEL DEMAND ANALYSIS
WP3	PLAN DEFINITION - OPERATING PLANS & COSTS
WP4	OPERATIONS CAPACITY ANALYSIS
WP5	INITIAL OPERATING PLAN - OPERATING PLANS AND COSTS
WP6	SIMULATION - OPERATING PLANS AND COSTS
WP7	SYSTEM SIZING - OPERATING PLANS AND COSTS
WP8	OPERATING COST PROCEDURES - OPERATING PLANS AND COSTS
WP9	CONCEPTS/OPTIONS - PHYSICAL PLANNING
WP10	CAPITAL COST PROCEDURES - PHYSICAL PLANNING (WITH UNIT PRICES)
WP11	Included in WP16
WP12	Included in WP13
WP13	FINAL CAPITAL FACILITIES - PHYSICAL PLANNING
WP14	ENVIRONMENTAL IMPACT ISSUES - EIA/DEIS
WP15	BASELINE ASSESSMENT - EIA/DEIS
WP16	INTERIM DETAILED ANALYSIS/EVALUATION OF SUBOPTIONS - EIS/DEIS
WP17	EVALUATION PROCEDURES - EIA/DEIS
WP18	FREIGHT PLAN
WP19	EVALUATION OF SERVICE SUB-OPTIONS
WP20	OPERATING COST APPLICATIONS

Appendix A.6 Noise Standards and Criteria

A compendium of various noise criteria will be used in evaluating noise impacts and the significance of noise levels for the five Queens subway alternatives. These include U.S. Environmental Protection Agency (EPA) criteria relating to noise levels identified as requisite to protect public health and welfare with an adequate margin of safety, U.S. Department of Housing and Urban Development (HUD) site acceptability standards, New York City (NYC) ambient noise quality criteria, UMTA criteria for evaluating the significance of noise impacts, American Public Transit Association (APTA) noise guidelines, Bolt, Beranek, and Neuman (BBN) criteria relating to the average ability to perceive changes in noise levels, and International Standards Organization (ISO) criteria relating to community response to increases in noise levels.

Noise Control Act of 1972. The Noise Control Act of 1972 (the Act) mandates a national policy "to promote an environment for all Americans free from noise that jeopardizes their health or welfare, ...to establish a means for effective coordination of Federal research activities in noise control, to authorize the establishment of Federal noise emission standards for products distributed in commerce, and to provide information to the public respecting the noise emission and noise reduction characteristics of such products." Section 5(a) (2) of the Act directs the Administrator of EPA to "...develop and publish criteria with respect to noise; ... publish information on the levels of environmental noise, the attainment and maintenance of which in defined areas under various conditions are requisite to protect the public health and welfare with an adequate margin of safety." The noise levels identified by EPA per the requirements of Section 5(a)(2) of the Act were published in March 1974 as "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (see Table A.6-1). These levels represent information required to be published by the Act and do not constitute enforceable federal regulations or standards. Nevertheless, the noise levels identified by EPA represent valid criteria for evaluating the effect of project noise on public health and welfare. Consequently, noise levels expected to be associated with the project will be evaluated against the EPA noise criteria.

Department of Housing and Urban Development Environmental Criteria and Standards. The United States Department of Housing and Urban Development (HUD) has adopted environmental standards, criteria, and guidelines for determining acceptability of federally-assisted projects and proposed mitigating measures to ensure that activities assisted by HUD will achieve the goal of a suitable living environment. Although the proposed project is not subject to HUD guidelines and these standards and criteria are directly applicable only to HUD-assisted programs, they do represent valid goals for any project. Table A.6-2 summarizes HUD site acceptability standards based on external noise levels. These standards reflect an EPA goal that exterior noise levels do not exceed a day-night average sound level of 55 decibels. This goal is not a mandated standard and does not take into account cost or feasibility.

HUD assistance for the construction of new noise sensitive land uses is prohibited generally for projects with unacceptable noise exposure and is discouraged for projects with Normally Unacceptable noise exposure with suitable mitigating measures. This policy applies to all HUD programs for residential

TABLE A.6-2

HUD SITE ACCEPTABILITY STANDARDS

	Outdoor L_{dn} (dBA)
Acceptable	Not exceeding 65
Normally Unacceptable	65 to 75
Unacceptable	Above 75

Source: Title 24, Code of Federal Regulations, Part 51.103(c), Exterior Standards

housing, college housing, mobile home parks, nursing homes, and hospitals. It also applies to HUD projects for land development, new communities, re-development or any other provision of facilities and services which are directed to making land available for housing or noise sensitive development.

HUD encourages noise attenuation features in new construction or in alterations of existing structures. The HUD mandated or recommended design mitigation measures to eliminate or minimize Unacceptable and Normally Unacceptable levels, respectively, include well sealed double glazed windows, forced air ventilation systems (permits windows to remain closed in summer) and acoustic shielding and insulation. Generally, HUD approval for projects in a Normally Unacceptable noise zone require a minimum of 5 decibels additional sound attenuation for buildings having noise-sensitive uses if the day-night average sound level is greater than 65 decibels but does not exceed 70 decibels, or a minimum of 10 decibels of additional sound attenuation if the day-night average sound level is greater than 70 decibels but does not exceed 75 decibels.

State of New York. Currently, the State of New York does not have any regulations which limit sound levels from proposed facilities such as the proposed project.

New York City Noise Code. The New York City Noise Control Code (Article VI of Part III of Chapter 57 of the Administrative Code of the City of New York, September 1, 1972 as amended) promulgates sound level standards for motor vehicles, air compressors, and paving breakers; requires that all exhausts be muffled; and prohibits all unnecessary noise adjacent to schools, hospitals, or courts. The code further limits construction activities to weekdays between 7 am and 6 pm.

In 1979, Section 1403.3-6.01 of the code was re-enacted as Local Law No. 64. This new law established ambient noise quality criteria and standards based on existing land-use zoning designations. Table A.6-3 summarizes the ambient noise quality criteria established under Local Law No. 64. Conformance with the noise level values contained in the law is determined by considering noise emitted directly from stationary activities within the boundaries of a project. Construction activities and noise sources outside the boundaries of a project are not included within the provisions of this law. Noise levels due to operation of the proposed project will be in compliance with criteria and standards contained within this law.

TABLE A.6-3

CITY OF NEW YORK AMBIENT NOISE QUALITY CRITERIA (dBA)

Ambient Noise Quality Zone	Daytime Standards* (7 AM - 10 PM)	Nighttime Standards* (10 PM - 7 AM)
Low Density Residential Land Use	60	50
High Density Residential Land Use	65	55
Commercial and Manufacturing Land Use	70	70

*L_{eq}

Source: City of New York Local Law No. 64.

New York CEPO-CEQR Noise Standards

The New York City Department of Environmental Protection, Bureau of Noise Abatement has set external noise exposure standards. These standards for non-airport environs are shown on Table A.6-4. Noise exposure is classifed into four categories -- acceptable, marginally acceptable, marginally unacceptable and clearly unacceptable. The standards shown in Table A.6-4 are based on maintaining a cumulative interior noise level L_5 less than or equal to 45 dBA during nighttime hours (between 11 PM to 7 AM) and of 55 dBA during daytime hours (between 7 AM and 11 PM), and of maintaining an interior noise level for the worst case hour L_{10} less than or equal to 45 dBA for nighttime and of 55 dBA for daytime hours.

Performance Standards for Manufacturing Districts

New York City's Zoning Resolution promulgates performance standards for uses in manufacturing districts. Noise levels from any activity, whether open or enclosed, cannot exceed certain prescribed sound pressure levels (dBA) on or beyond the lot line. Operation of motor vehicles or other transportation facilities is not included in the performance standard. The standards are shown on Table A.6-5. When a manufacturing district adjoins a residential district, the maximums are reduced by six dBA.

APTA

Guidelines for the maximum acceptable sound levels in neighboring communities from urban rail systems have been established by the American Public Transit Association (APTA) in its 1976 Final Committee Report of Guidelines and Principles for Design of Rapid Transit Facilities. Table A.6-6 presents the acceptable levels for airborne noise from train operations for dwellings and buildings.

TABLE A.6-4

NOISE EXPOSURE STANDARDS FOR NOISE RECEPTORS
FOR USE IN CITY ENVIRONMENTAL IMPACT
REVIEW

Noise Receptor Classification	Time Period	Acceptable General External Exposure	Marginally Acceptable General External Exposure	Marginally Unacceptable General External Exposure	Clearly Unacceptable General External Exposure
1. Outdoor Areas, requiring serenity and quiet	Cumulative for hours of use	$L_5 \leq 55$ dBA $L_{10} \leq 55$ dBa (worst hr)			
2. Hospitals & Nursing Homes	Cumulative 7AM-11PM 11PM-7AM	$L_5 \leq 55$ dBA $L_{10} \leq 55$ dBA (worst hr)	55 $L_5 \leq 65$ dBA 55 $L_{10} \leq 65$ dBA (worst hr)	65 $L_5 \leq 80$ dBA 65 $L_{10} \leq 80$ dBA (worst hr)	$L_5 > 80$ dBA $L_{10} > 80$ dBA (worst hr)
3. Residential, incl. residential hotels & motels	Cumulative 7AM-11PM	$L_5 \leq 65$ dBA $L_{10} \leq 65$ dBA (worst hr)	65 $L_5 \leq 70$ dBA 65 $L_{10} \leq 70$ dBA (worst hr)	70 $L_5 \leq 80$ dBA 70 $L_{10} \leq 80$ dBA (worst hr)	$L_5 > 80$ dBA $L_{10} > 80$ dBA (worst hr)
	11PM-7AM	$L_5 \leq 55$ dBA $L_{10} \leq 55$ dBA (worst hr)	55 $L_5 \leq 70$ dBA 55 $L_{10} \leq 70$ dBA (worst hr)	70 $L_5 \leq 80$ dBA 70 $L_{10} \leq 80$ dBA (worst hr)	$L_5 > 80$ dBA $L_{10} > 80$ dBA (worst hr)
4. Schools, museums, libraries, courts, houses of worship, transient hotels & motels, public meeting rooms, auditoriums, and out patient public health facilites.	Cumulative for hours of use	———	Same as Residential Day (7 AM - 11 PM)		———
5. Commercial Offices	Cumulative for hours of use	———	Same as Residential Day (7 AM - 11 PM)		———
6. Industrial, public areas only	Cumulative for hours of use	$L_5 \leq 70$ dBA $L_{10} \leq 70$ dBA (worst hr)	70 $L_5 \leq 80$ dBA 70 $L_{10} \leq 80$ dBA (worst hr)		$L_5 > 80$ dBA $L_{10} > 80$ dBA (worst hr)

Source: NYC Bureau of Noise Abatement, BNA 40206 CEPO

TABLE A.6-5

CITY OF NEW YORK NOISE PERFORMANCE STANDARDS
FOR MANUFACTURING DISTRICTS

Octave Band (cycles per second)	Maximum Sound Pressure Level (in decibels) District M1	M2	M3
20-75	79	79	80
75-150	74	75	75
150-300	66	68	70
300-600	59	62	64
600-1200	53	56	58
1,200-2,400	47	51	53
2,400-4,800	41	47	49
Above 4,800	39	44	46

TABLE A.6-6

APTA GUIDELINES ON MAXIMUM AIRBORNE NOISE
FROM TRAIN OPERATIONS

		Single Event Maximum Noise Level Design Goal		
Community Area Category		Single Family Dwellings	Multi-Family Dwellings	Commercial Buildings
I	Low Density Residential	70 dBA	75 dBA	80 dBA
II	Average Residential	75	75	80
III	High Density Residential	75	80	85
IV	Commercial	80	80	85
V	Industrial/Highway	80	85	85

These design goal guidelines are applied to nighttime operations because the sensitivity to noise is greater at night than during daytime hours. Because of the transient nature of train noise, community acceptance should be expected if the noise levels do not exceed these guidelines at night at the affected buildings or use areas.

APTA recommends that for some types of buildings or occupancies maximum noise level limits should be applied regardless of the community area category (i.e., studios, schools, theatres, amphitheatres and churches). Table A.6-7 shows the APTA guidelines for maximum airborne noise from train operations for such uses.

TABLE A.6-7

APTA GUIDELINES ON MAXIMUM AIRBORNE NOISE
FROM TRAIN OPERATIONS FOR SENSITIVE LAND USES

Building Occupancy Type	Single Event Maximum Noise Level Design Goal
Amphitheatres	60 dBA
"Quiet" Outdoor Recreation Areas	65 dBA
Concert Halls, Radio and TV Studios, Auditoriums	70 dBA
Churches, Theatres, Schools, Hospitals, Museums, Libraries	75 dBA

Human Perception and Community Response to Changes in Noise Levels

Human response to changes in noise levels depends on a number of factors, including the quality of the sound, the magnitude of the changes, the time of day at which the changes take place, whether the noise is continuous or intermittent, and the individual's ability to perceive the changes. Human ability to perceive changes in noise levels varies widely with the individual, as does response to the perceived changes. However, the average ability of an individual to perceive changes in noise levels is well documented (see Table A.6-8). Generally, changes in noise levels less than 3 dBA will be barely perceptible to most listeners, whereas, a 10 dBA change normally is perceived as a doubling (or halving) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

TABLE A.6-8

AVERAGE ABILITY TO PERCEIVE CHANGES IN NOISE LEVELS

Change (dBA)	Human Perception of Change
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of sound
20	A "dramatic change"
40	Difference between a faintly audible sound and a very loud sound

Source: Bolt Beranek and Neuman, Inc., Funamentals and Abatement of Highway Traffic Noise, Report No. PB-222-703. Prepared for Federal Highway Administration, -- June 1973.

Various government and research institutions have proposed criteria that attempt to relate changes in noise levels to community response. One commonly applied criterion for estimating response is incorporated into the community response scale proposed by the International Standards Organization (ISO) of the United Nations (Table A.6-9). This scale relates changes in noise level to the degree of community response, and permits direct estimation of the probable response of a community to predicted change in noise level.

In order to estimate human perception of a community response to changes in noise levels that may be associated with operation of the proposed project, predicted increases in noise levels will be compared against the two sets of criteria described above. Neither of these sets of criteria constitutes legally enforceable noise standards, but each does represent a yardstick for evaluating the effect of the project noise on the noise environment of the surrounding community.

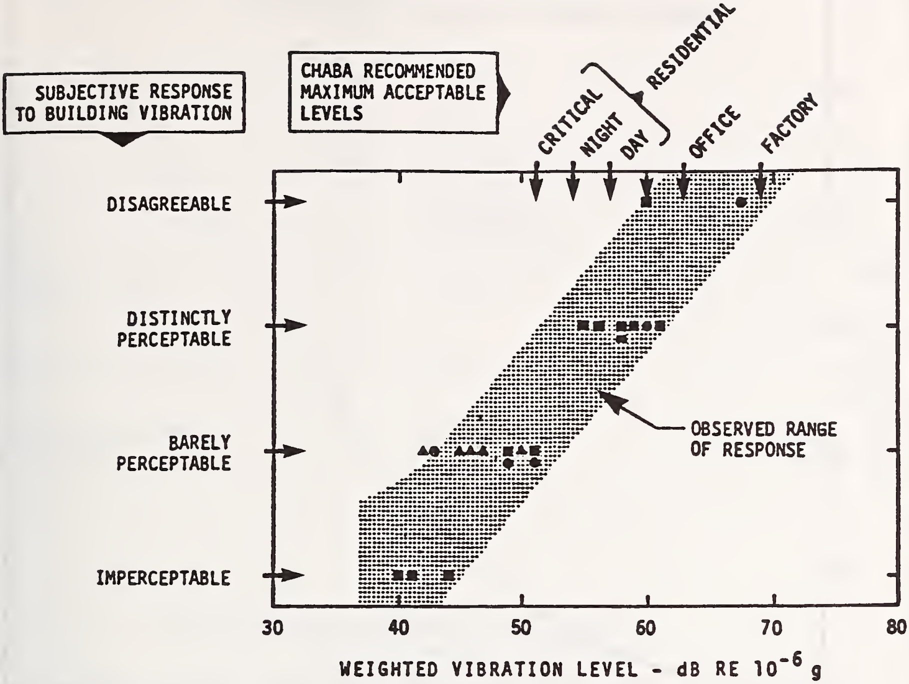
TABLE A.6-9

COMMUNITY RESPONSE TO INCREASES IN NOISE LEVELS

	Estimated Community Response	
Change (dBA)	Category	Description
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action
20	Very strong	Vigorous community action

Source: International Standards Organization, Noise Assessment with Respect to Community Responses, 150/TC 43. (New York: United Nations, November 1969.)

Appendix A.7 Vibration Diagrams



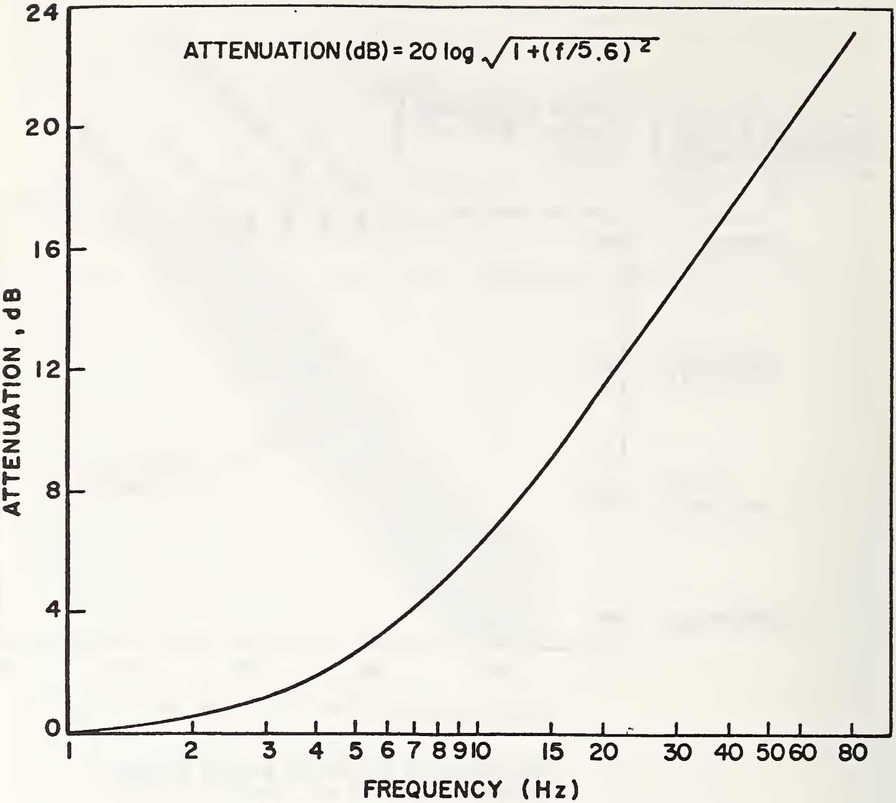
THE APPROXIMATE CONVERSION BETWEEN WEIGHTED VIBRATION LEVEL (L_W) AND VELOCITY LEVEL IS:

L_V (dB re 10^{-6} in/sec) = $L_W + 21$

L_V (dB re 10^{-8} in/sec) = $L_W + 29$

RANGE OF HUMAN RESPONSE TO BUILDING VIBRATION (adapted from Ref. 2.24)

Figure A. 7-1



Note: Electrical network for low frequency cutoff below 1 Hz and high frequency cutoff above 80 Hz not yet standardized.

WEIGHTING CHARACTERISTIC FOR BUILDING VIBRATION IN TERMS OF HUMAN RESPONSE

Figure A. 7-2

	Ground Vibration Limits	
	Weighted Acceleration[1]	Equivalent Velocity [2]
Normally Safe	1 m/sec	28 mm/sec (1.1 in./sec)
Potentially Unsafe	.5 to 1 m/sec^2	13 to 28 mm/sec (.5 to 1.1 in./sec)
Ancient Monuments and Ruins	.05 m/sec^2	1.3 mm/sec (.05 in./sec)

[1] Acceleration weighted with curve proposed by CHABA report (Ref 2.5)

[2] Above 10 Hz, the velocity in mm/sec is approximately equal to 28.4 times the acceleration in m/sec^2

VIBRATION LIMITS FOR CONSTRUCTION ACTIVITIES (adapted from Ref. 2.5) Figure A. 7-3

Appendix A.8 <u>Photo Description - Montauk Line in Forest Park</u>

Figure A.8-1	PHOTO INDEX-AREA DESCRIPTION
Photos 1-17	PHOTOS ALONG MONTAUK LINE THROUGH FOREST PARK

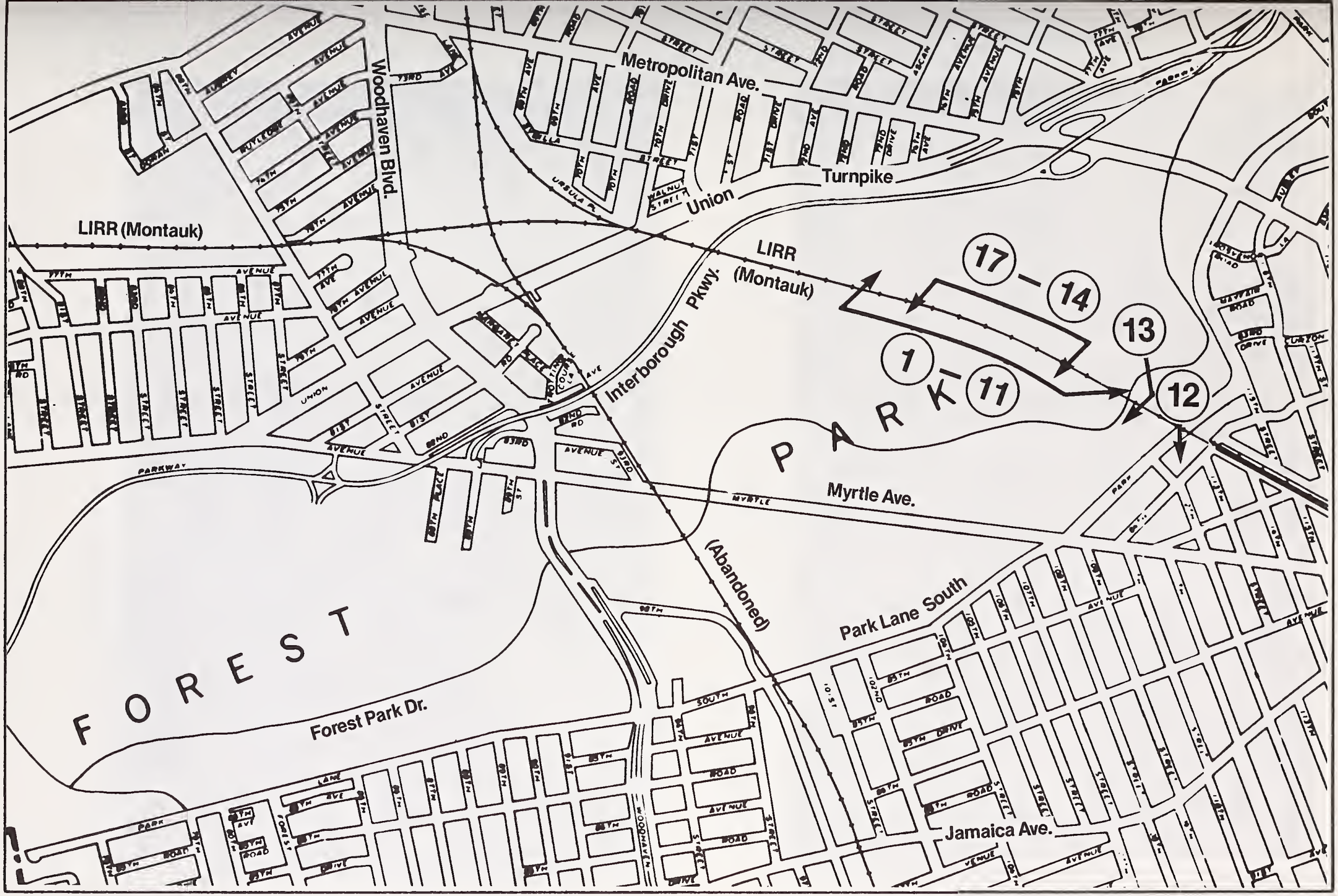


PHOTO INDEX — AREA DESCRIPTION
Along Montauk Line thru Forest Park

Figure A. 8-1

1. Bridle Path in Vicinity of RR ROW

2. RR ROW - Encroaching Vegetation - Looking East

3. Typical View Along Northside ROW

4. American Beech - Light Grey Bark; Minimal Understory; Bridle Path

5. Mature Red Oak (Foreground)

6. Fallen Trees - Breached Fenceline

7. Stand of Tree of Heaven, Trackside

8. Swale - Note Absence of Wetland Vegetation

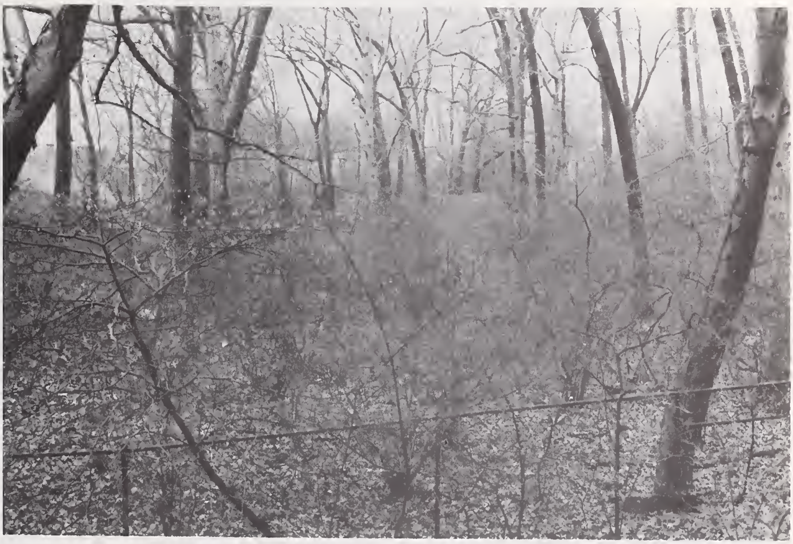
9. Typical View North of ROW

10. Heavier Understory Toward East End

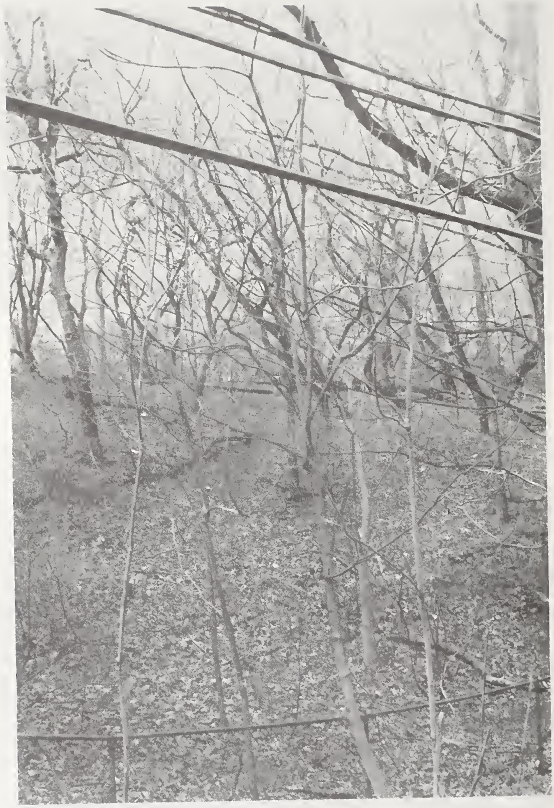
11. Forest Park Drive Overpass

12. Lone Adult Tree of Heaven; Residence on Park Lane South

13. Signs of Spring (Viburnam)



14. Viburnam Undergrowth



15. Heavier Understory Toward East End

16. Littered Area (Note Wrecked Car)

17. Lighter Canopy Cover Southside

Appendix A.9 <u>Design Drawings</u>

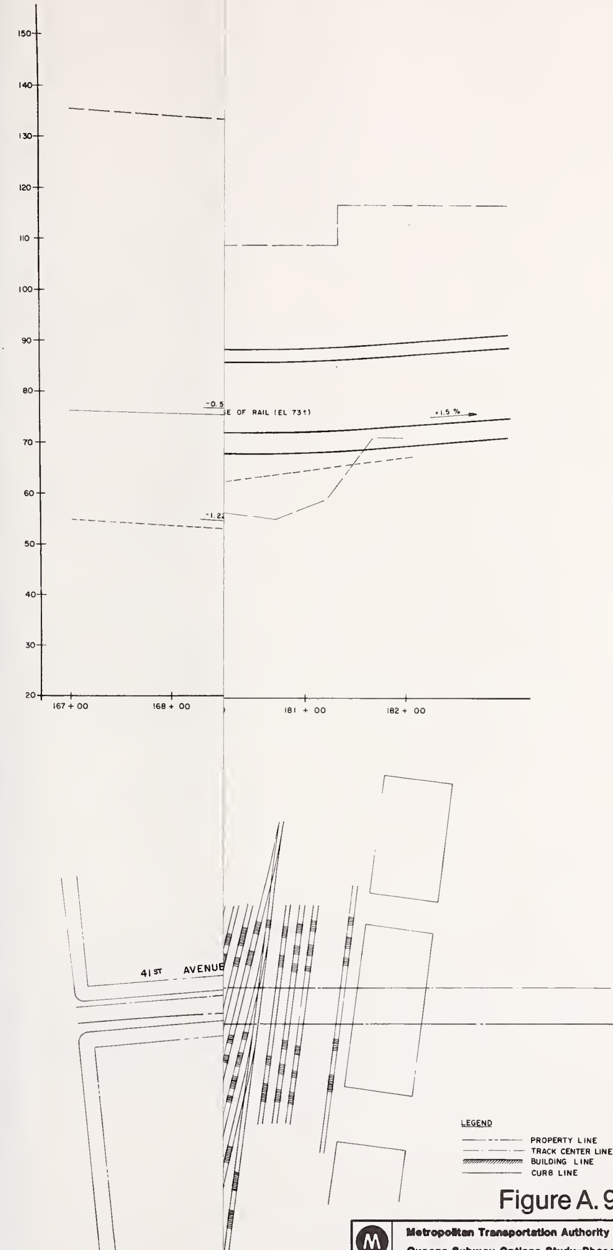


Figure A. 9-1

Metropolitan Transportation Authority

Queens Subway Options Study-Phase II

GIBBS & HILL, INC AKRF, INC.	VOLLMER ASSOCIATES BARTON-ASCHMAN ASSOCIATES, INC.

QUEENS BYPASS EXPRESS

PLAN AND PROFILE OF NORTHERN BLVD. STATION

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER QBE-S-1
SCALE: AS NOTED		

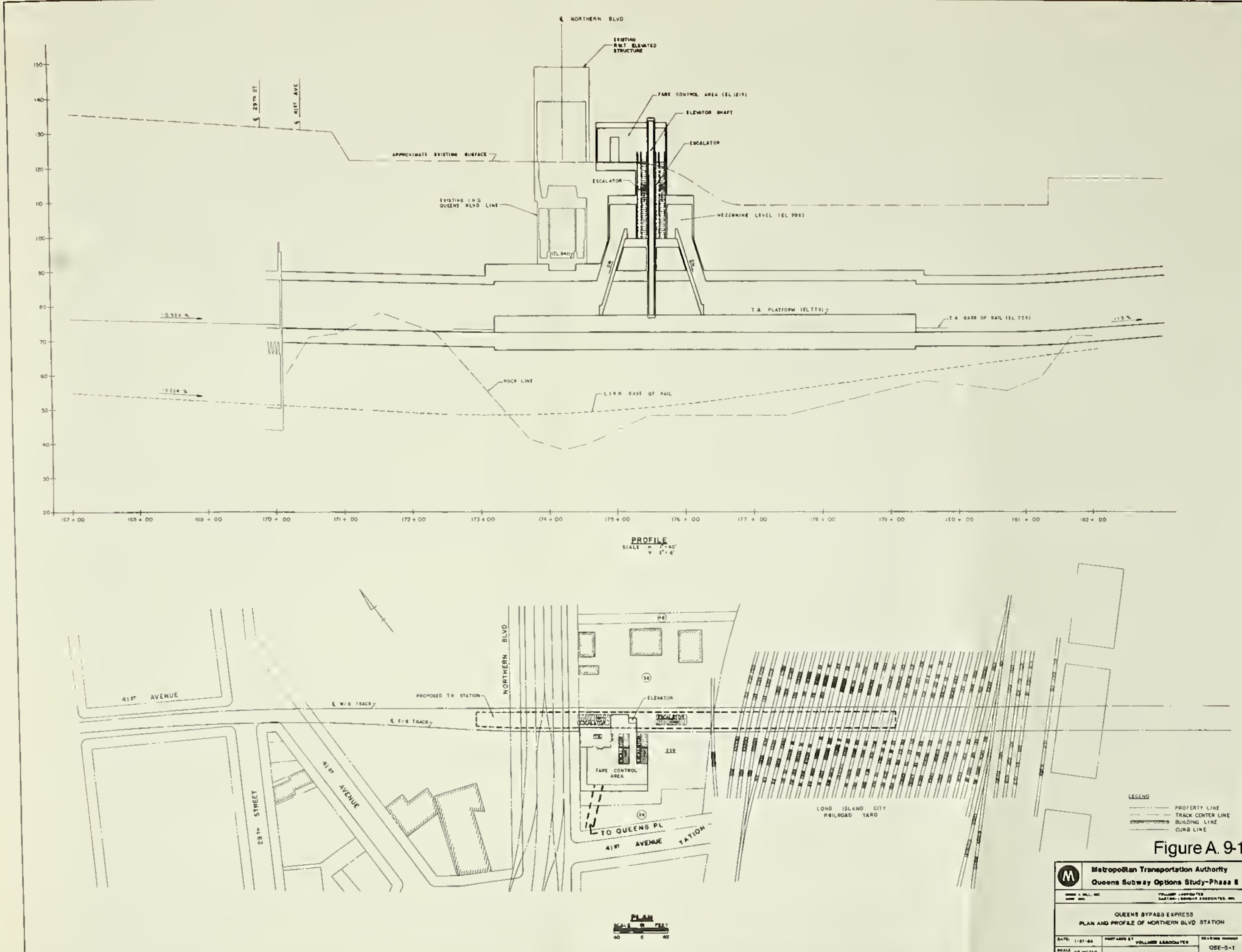


Figure A. 9-1

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

QUEENS BYPASS EXPRESS
PLAN AND PROFILE OF NORTHERN BLVD STATION

DRAWING NUMBER QBE-S-1

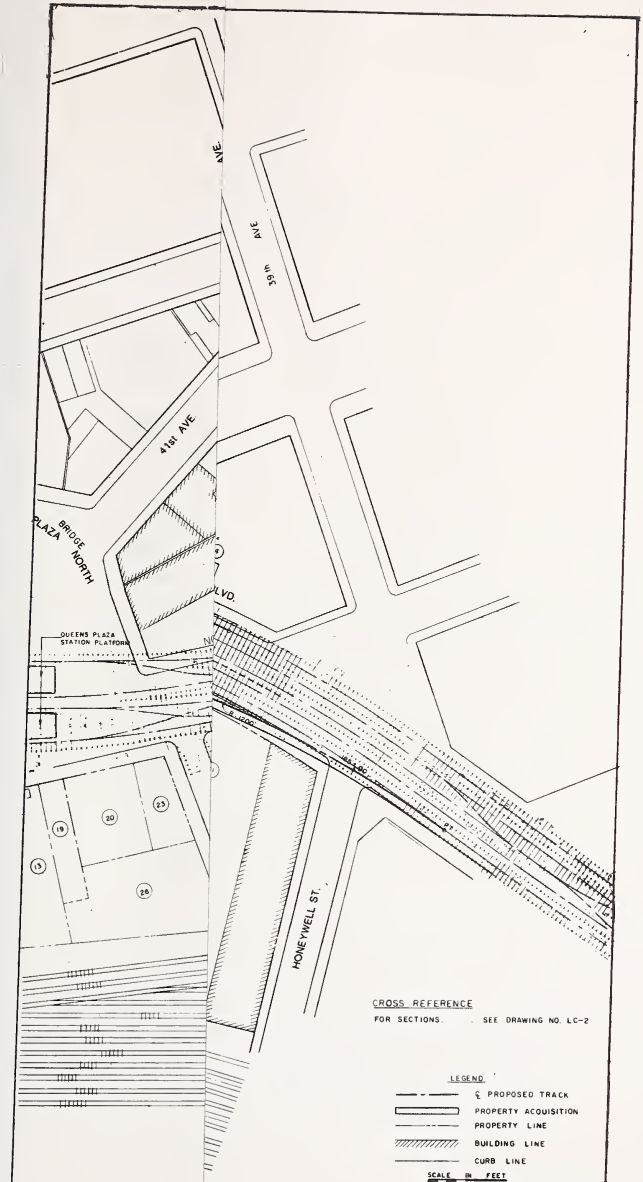


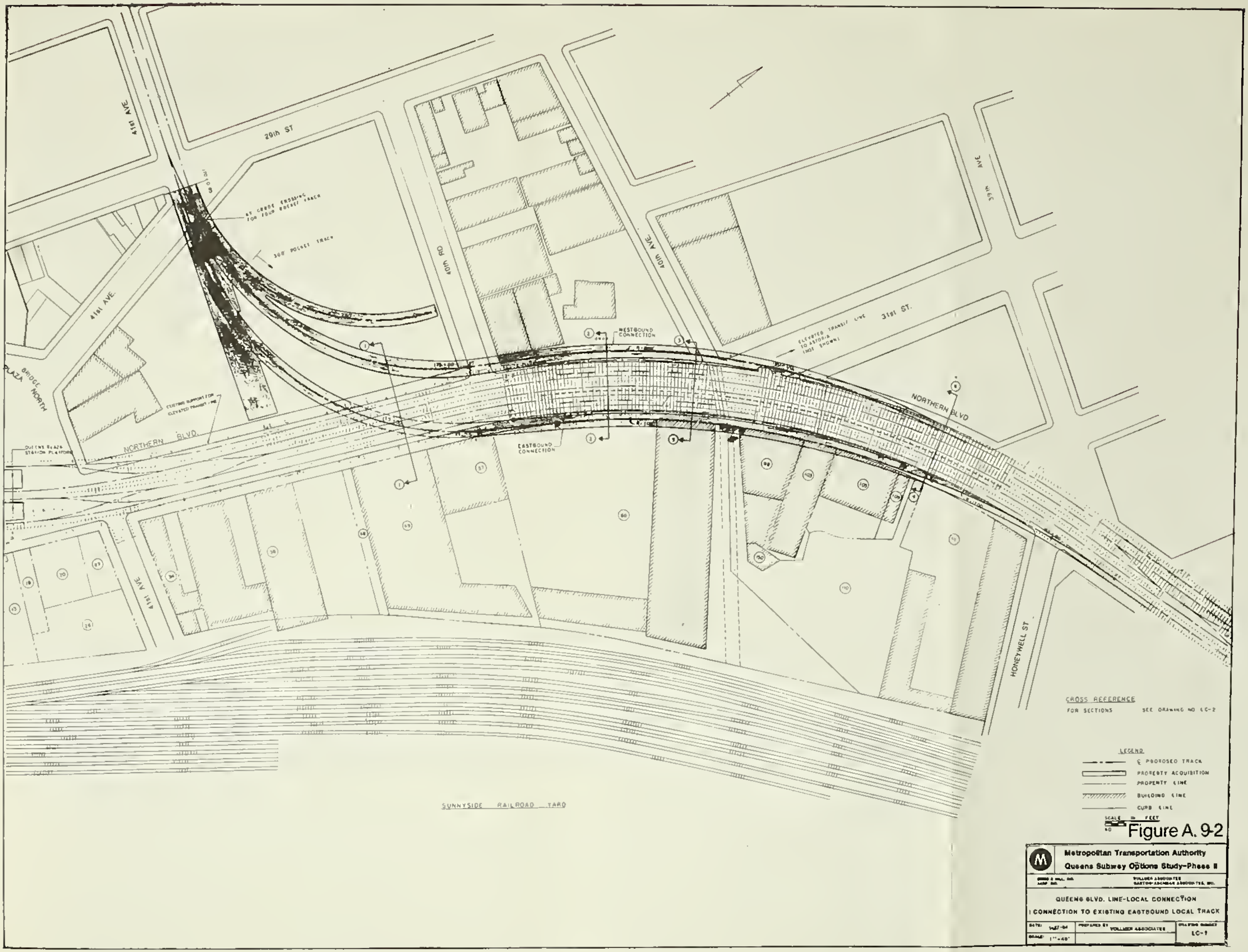
Figure A. 9-2

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC.
AKRF, INC.
VOLLMER ASSOCIATES
BARTON-ASCHMAN ASSOCIATES, INC.

QUEENS BLVD. LINE-LOCAL CONNECTION
CONNECTION TO EXISTING EASTBOUND LOCAL TRACK

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER LC-1
SCALE: 1" = 40'		


29th ST
41st AVE
40th RD
40th AVE
39th AVE
31st ST.
NORTHERN BLVD.
NORTHERN BLVD
41st AVE
HONEYWELL ST
QUEENS PLAZA NORTH
WESTBOUND CONNECTION
EASTBOUND CONNECTION
300' POCKET TRACK
ELEVATED TRANSIT LINE TO ASTORIA (NOT SHOWN)
SUNNYSIDE RAILROAD YARD
CROSS REFERENCE
FOR SECTIONS SEE DRAWING NO LC-2
LEGEND
℄ PROPOSED TRACK
PROPERTY ACQUISITION
PROPERTY LINE
BUILDING LINE
CURB LINE
SCALE IN FEET
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
VOLLMER ASSOCIATES
QUEENS BLVD. LINE-LOCAL CONNECTION
CONNECTION TO EXISTING EASTBOUND LOCAL TRACK
PREPARED BY VOLLMER ASSOCIATES
LC-1
Figure A. 9-2

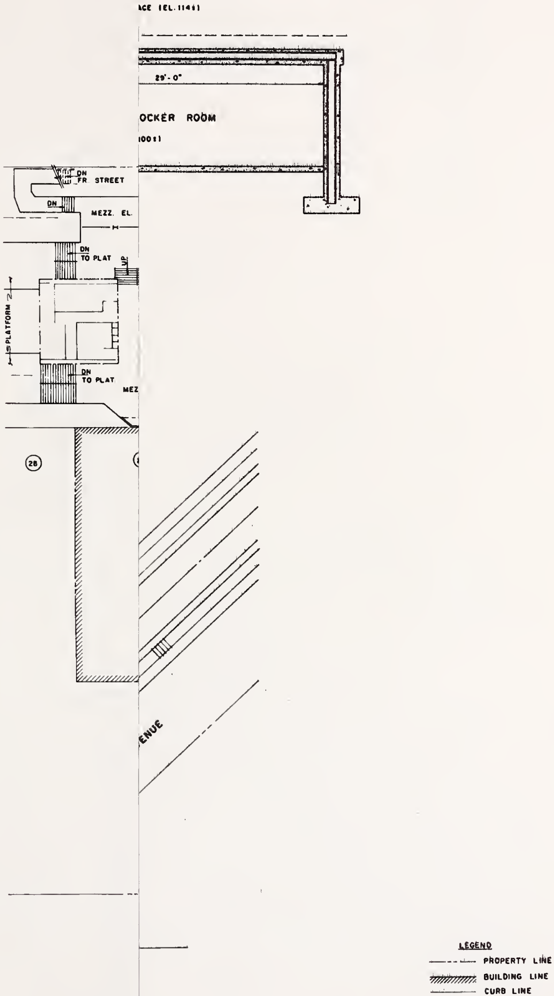


Figure A. 9-3

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

VOLLMER ASSOCIATES
BARTON-ASCHMAN ASSOCIATES, INC.

QUEENS BLVD. LINE-LOCAL CONNECTION
PLAN OF PEDESTRIAN CONNECTION
COURTSQUARE TO 23RD ST./ELY AVE. STATION

DATE: 1-27-84
PREPARED BY VOLLMER ASSOCIATES
DRAWING NUMBER LC-4
SCALE: AS NOTED

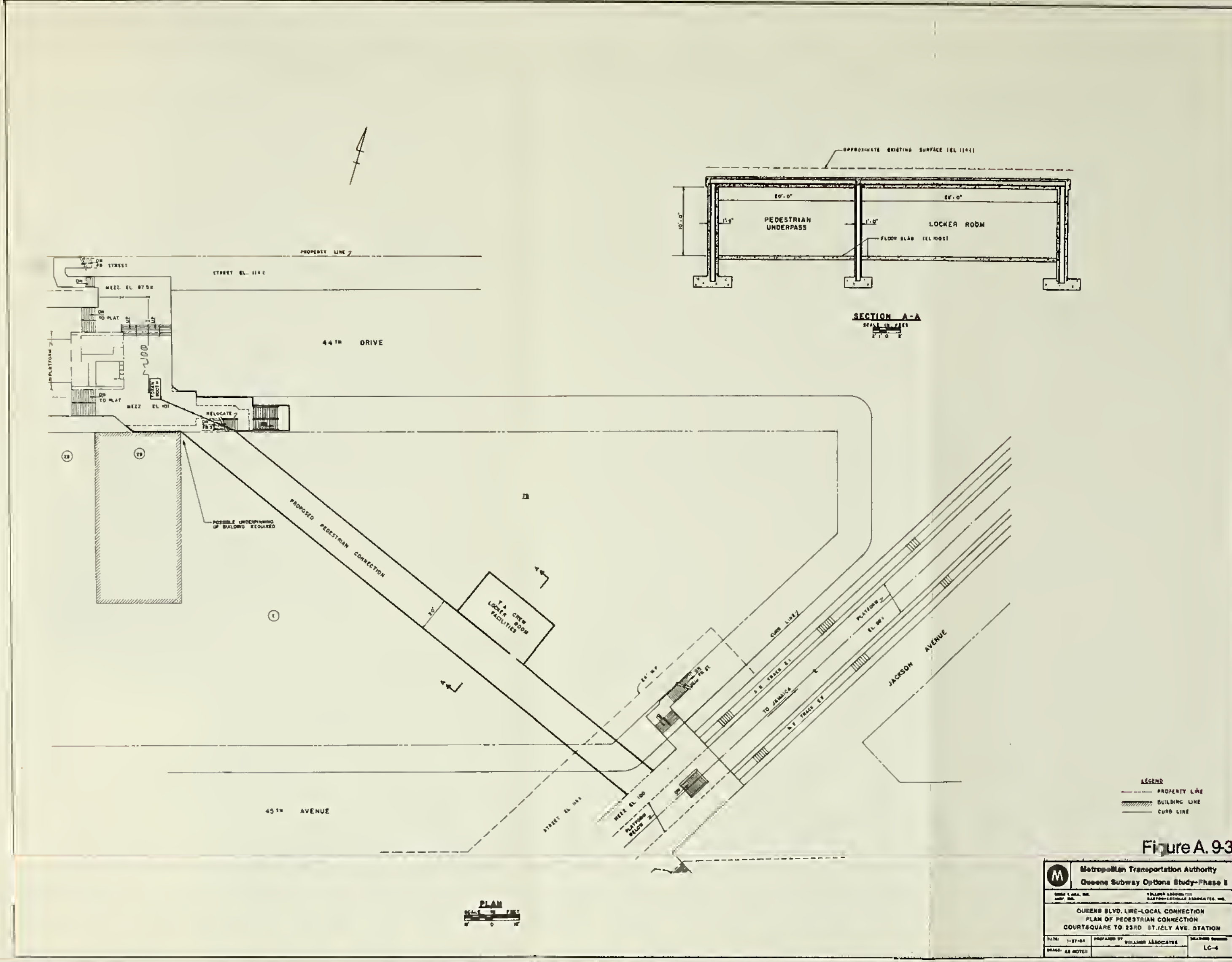
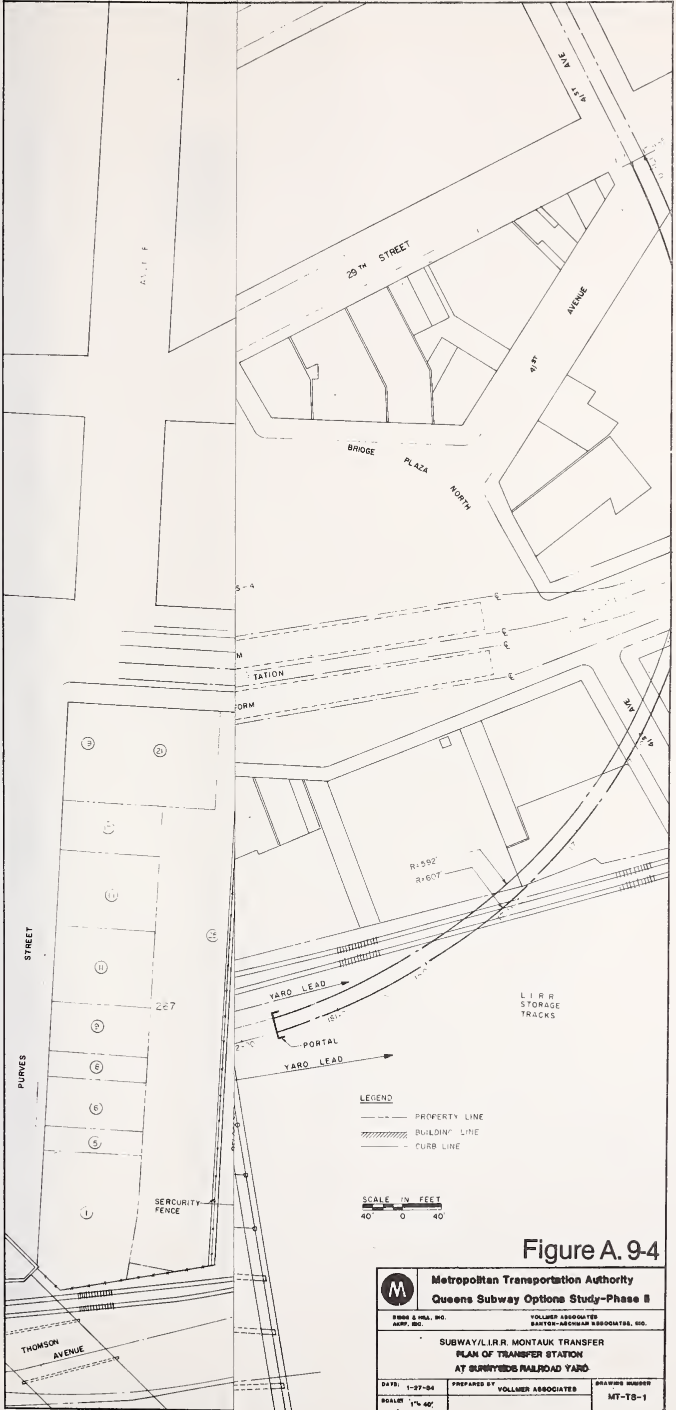

PEDESTRIAN UNDERPASS
LOCKER ROOM
SECTION A-A
44TH DRIVE
STREET EL. 114±
MEZZ. EL. 101
RELOCATE
POSSIBLE UNDERPINNING OF BUILDING REQUIRED
PROPOSED PEDESTRIAN CONNECTION
T.A. CREW LOCKER ROOM FACILITIES
CURB LINE
PLATFORM
TO JAMAICA
JACKSON AVENUE
45TH AVENUE
MEZZ. EL. 100
PLATFORM BELOW
PLAN
LEGEND
PROPERTY LINE
BUILDING LINE
CURB LINE
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
QUEENS BLVD. LINE-LOCAL CONNECTION
PLAN OF PEDESTRIAN CONNECTION
COURTSQUARE TO 23RD ST./ELY AVE. STATION
SCALE: AS NOTED
LC-4

Figure A. 9-3



41ST AVE
29TH STREET
41ST AVENUE
BRIDGE PLAZA NORTH
TATION
FORM
41ST AVE
R=592'
R=607'
YARD LEAD
PORTAL
YARD LEAD
L I R R STORAGE TRACKS
PURVES STREET
SERCURITY FENCE
THOMSON AVENUE
LEGEND
PROPERTY LINE
BUILDING LINE
CURB LINE
SCALE IN FEET
40' 0 40'
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
SUBWAY/L.I.R.R. MONTAUK TRANSFER
PLAN OF TRANSFER STATION
AT SUNNYSIDE RAILROAD YARD
DATE: 1-27-84
SCALE: 1"= 40'
PREPARED BY VOLLMER ASSOCIATES
DRAWING NUMBER MT-TS-1

Figure A. 9-4

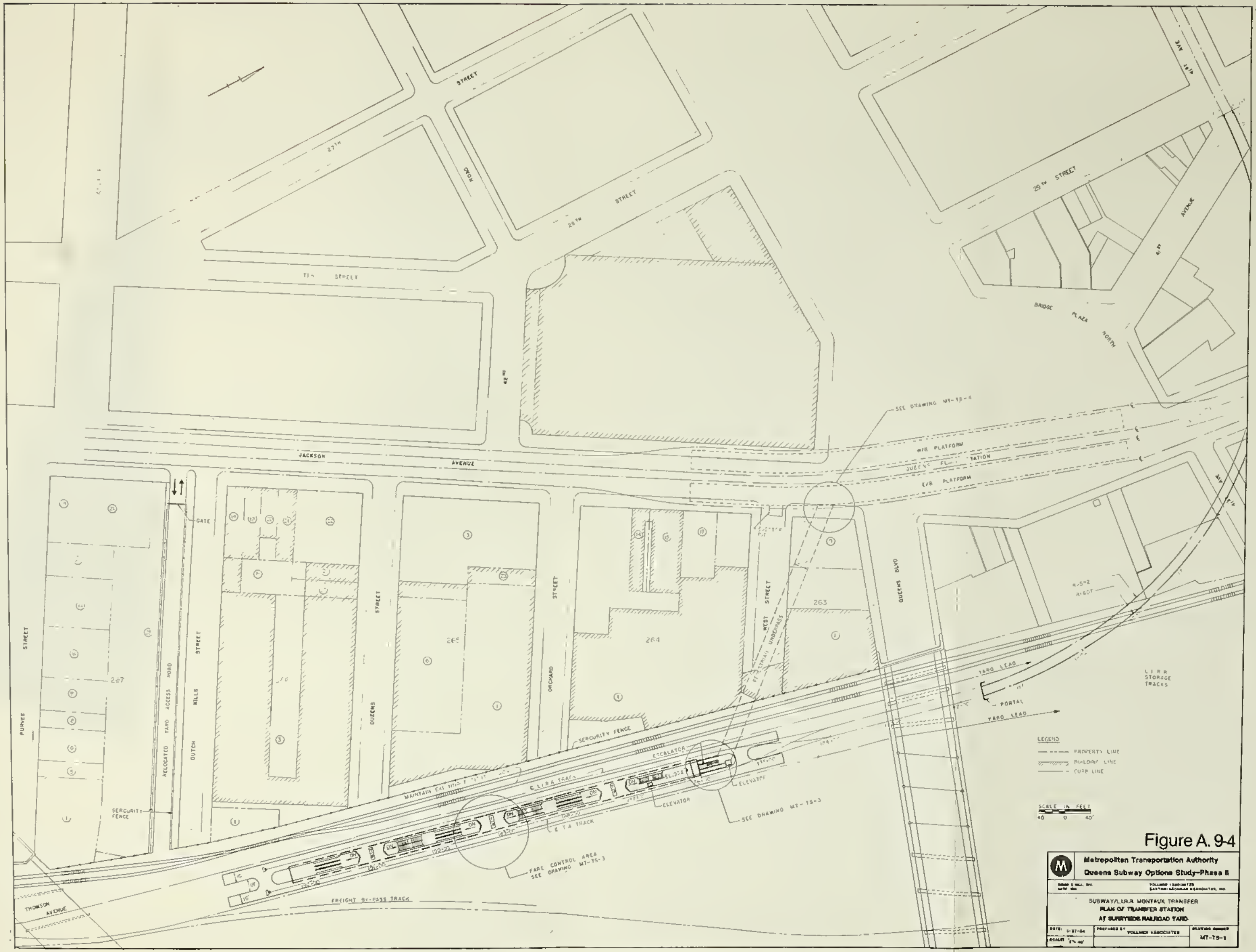
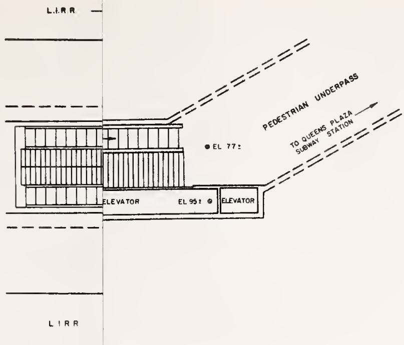

Metropolitan Transportation Authority
Queens Subway Options Study–Phase II
SUBWAY/L.I.R.R. MONTAUK TRANSFER
PLAN OF TRANSFER STATION
AT SUNNYSIDE RAILROAD YARD
PREPARED BY VOLLMER ASSOCIATES
MT-TS-1
SCALE IN FEET
40 0 40'
LEGEND
PROPERTY LINE
BUILDING LINE
CURB LINE
JACKSON AVENUE
QUEENS BLVD
QUEENS STREET
ORCHARD STREET
WEST STREET
DUTCH KILLS STREET
PURVES STREET
THOMSON AVENUE
RELOCATED YARD ACCESS ROAD
GATE
SECURITY FENCE
W/B PLATFORM
E/B PLATFORM
SEE DRAWING MT-TS-4
SEE DRAWING MT-TS-3
FARE CONTROL AREA SEE DRAWING MT-TS-3
ESCALATOR
ELEVATOR
YARD LEAD
PORTAL
L.I.R.R. STORAGE TRACKS
FREIGHT BY-PASS TRACK
BRIDGE PLAZA NORTH
29TH STREET
28TH STREET
27TH STREET
42ND ROAD
263
264
265
267

Figure A. 9-4



)ERPASS CONNECTION TO T.A. PLATFORM

SCALE IN FEET
2 1 0 1 2

Figure A. 9-5

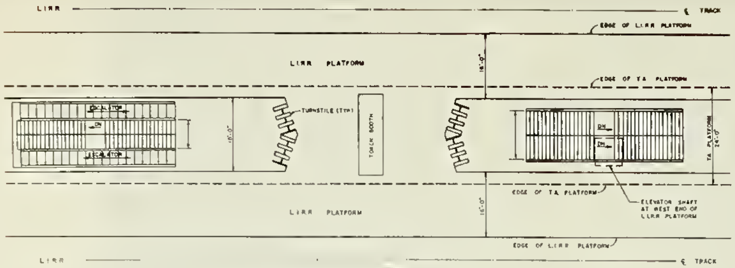
Metropolitan Transportation Authority

Queens Subway Options Study-Phase II

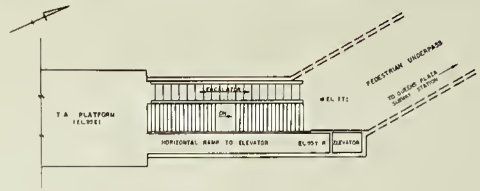
DIBBS & HILL, INC.
AKRF, INC.
VOLLMER ASSOCIATES
BARTON-ASCHMAN ASSOCIATES, INC.

SUBWAY/L.I.R.R. MONTAUK TRANSFER
DETAIL SECTIONS OF TRANSFER
STATION AT SUNNYSIDE RAILROAD YARD

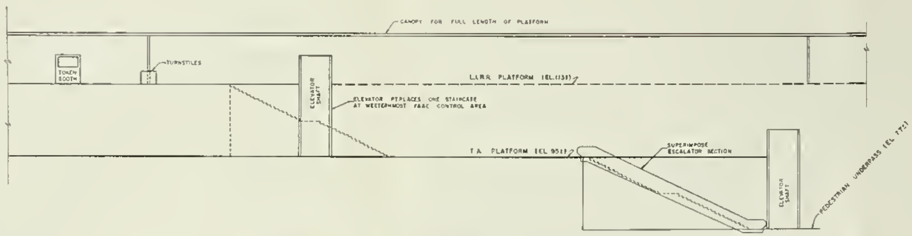
DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-TS-3
SCALE AS NOTED		



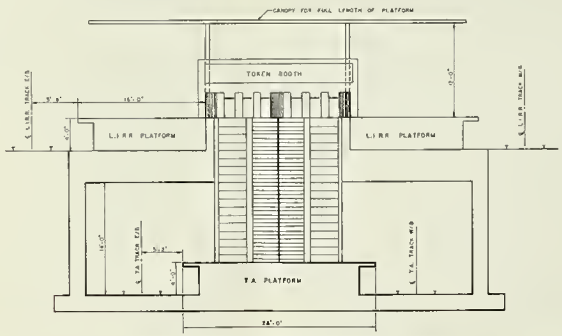
PLAN OF TYPICAL FARE CONTROL AREA
SCALE IN FEET



PLAN OF PEDESTRIAN UNDERPASS CONNECTION TO T.A. PLATFORM
SCALE IN FEET



PARTIAL LONGITUDINAL SECTION
CONNECTING PROPOSED T.A. & L.I.R.R. PLATFORM
SCALE IN FEET



TYPICAL CROSS SECTION OF FARE CONTROL AREA
SCALE IN FEET

Figure A. 9-5

Metropolitan Transportation Authority
Queens Subway Options Study–Phase II

SUBWAY/L.I.R.R. MONTAUK TRANSFER
DETAIL SECTIONS OF TRANSFER
STATION AT SUNNYSIDE RAILROAD YARD

DATE:	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-TS-5
SCALE AS NOTED		

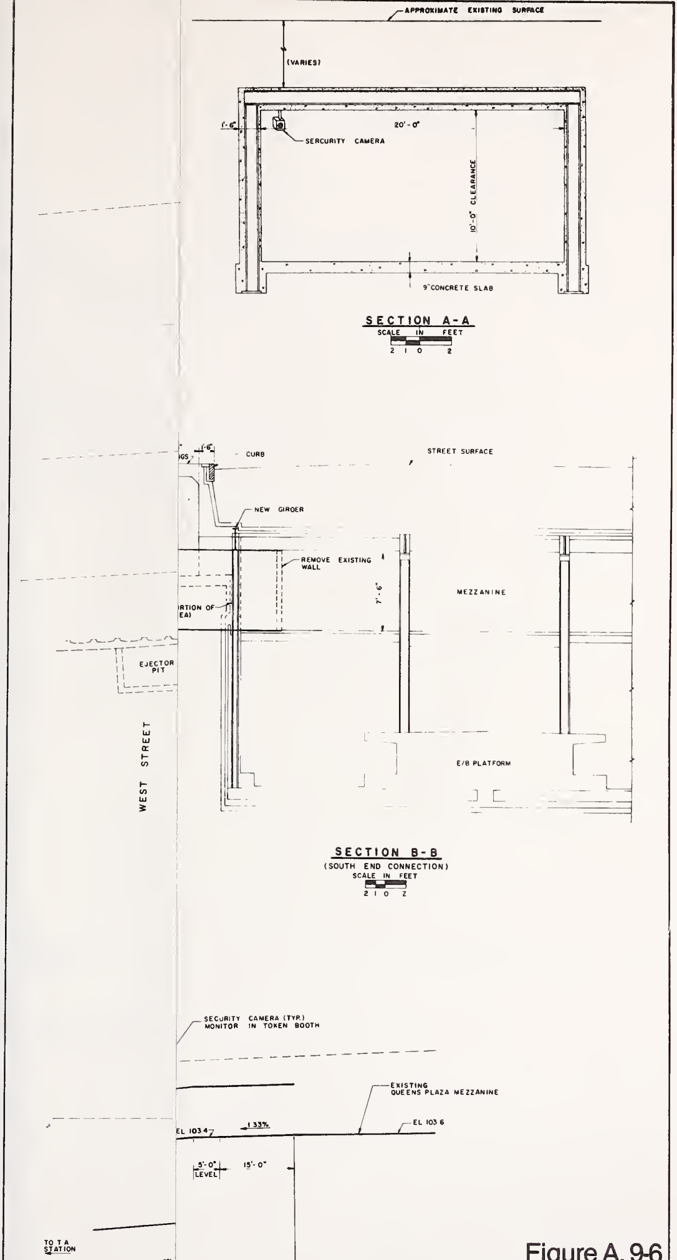


Figure A. 9-6

Metropolitan Transportation Authority

Queens Subway Options Study-Phase II

SUBWAY/L.I.R.R. MONTAUK TRANSFER
PEDESTRIAN CONNECTION FROM TRANSFER STATION
TO EXISTING QUEENS PLAZA STATION

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-TS-4
SCALE AS NOTED		

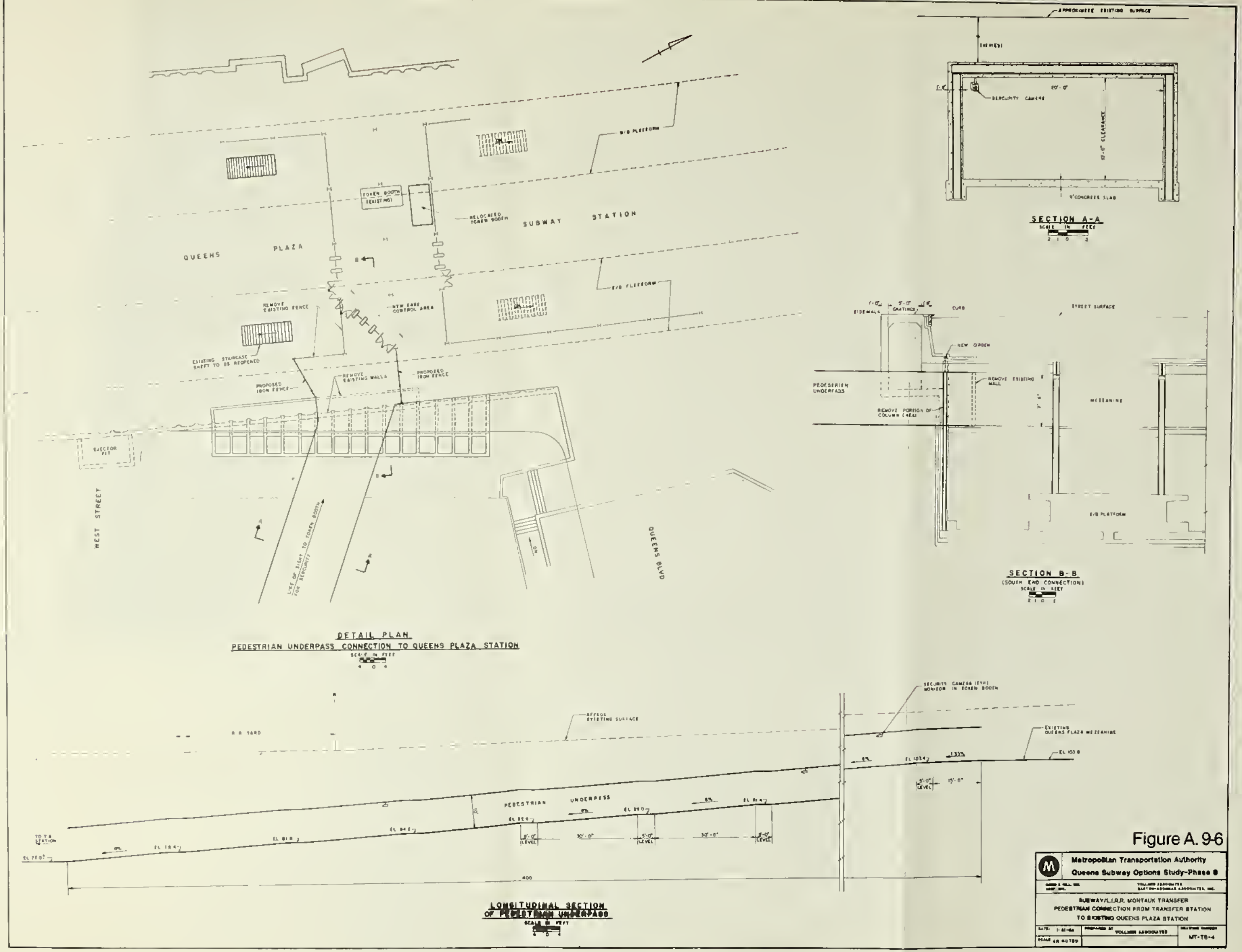


Figure A. 9-6

Metropolitan Transportation Authority
Queens Subway Options Study–Phase II

SUBWAY/L.I.R.R. MONTAUK TRANSFER
PEDESTRIAN CONNECTION FROM TRANSFER STATION
TO EXISTING QUEENS PLAZA STATION

PREPARED BY VOLLMER ASSOCIATES
MT-TS-4

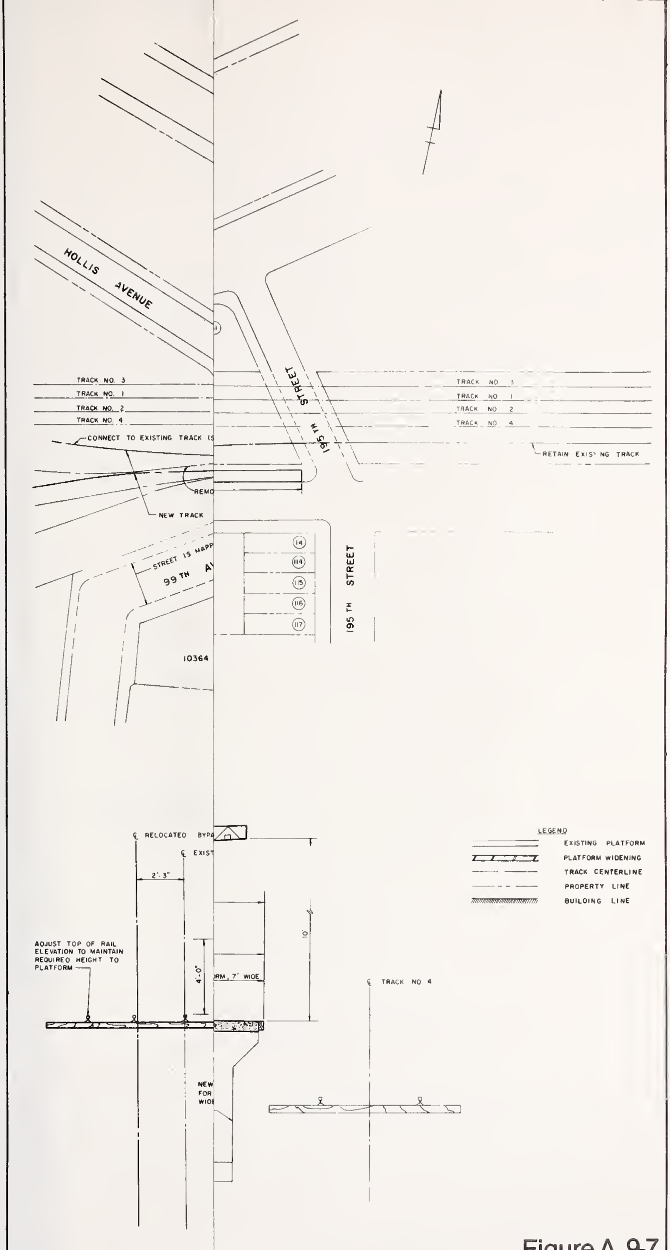


Figure A. 9-7

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC.
AKRF, INC.

VOLLMER ASSOCIATES
BARTON-ASCHMAN ASSOCIATES, INC.

SUBWAY/LIRR MONTAUK TRANSFER
PLAN OF HOLLIS STATION

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-QOS-1
SCALE: AS NOTED		

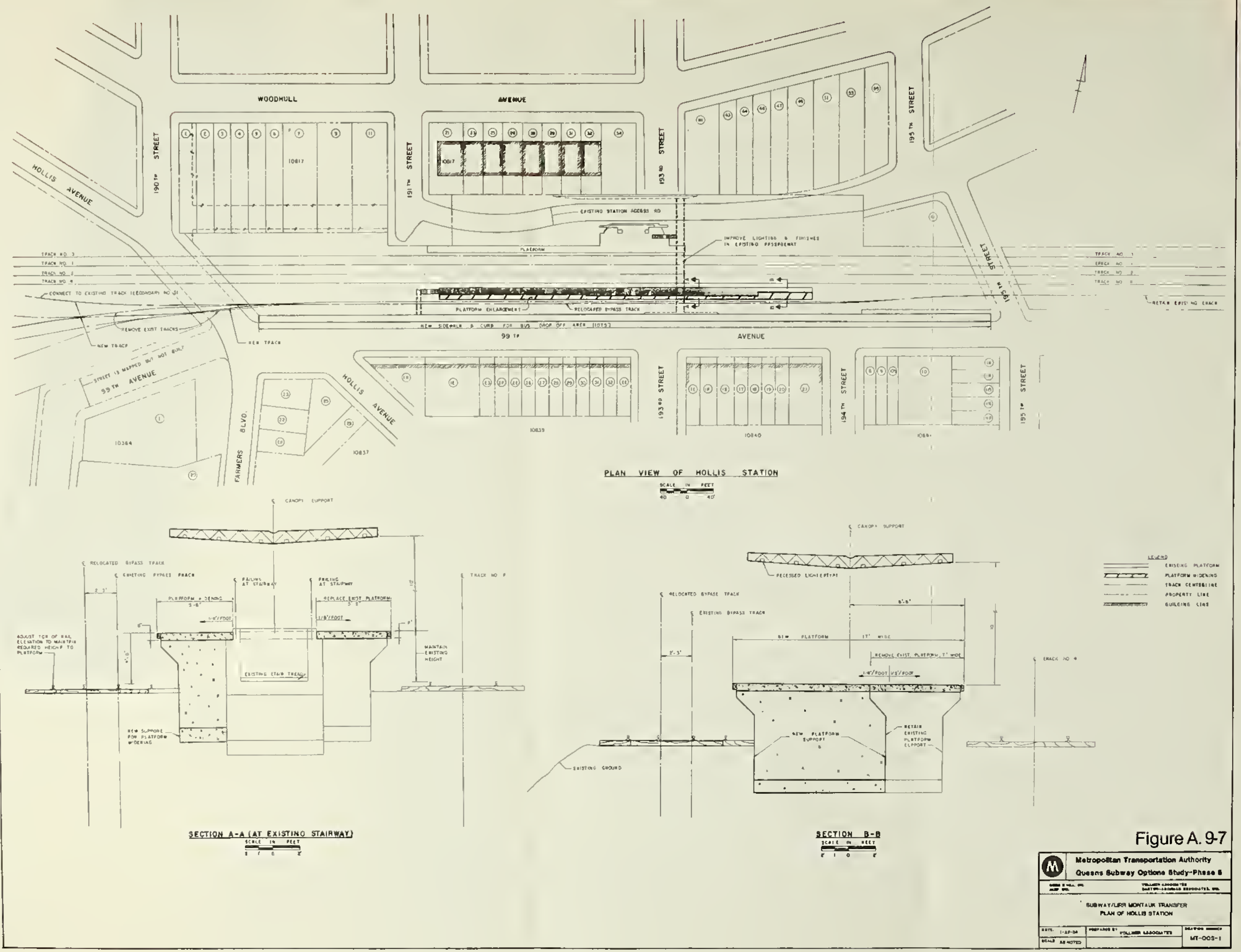

WOODHULL
AVENUE
190TH STREET
191TH STREET
193RD STREET
195TH STREET
HOLLIS AVENUE
EXISTING STATION ACCESS RD
PLATFORM
IMPROVE LIGHTING & FINISHES IN EXISTING PASSAGEWAY
TRACK NO. 3
TRACK NO. 1
TRACK NO. 2
TRACK NO. 4
CONNECT TO EXISTING TRACK (SECONDARY NO. 3)
PLATFORM ENLARGEMENT
RELOCATED BYPASS TRACK
REMOVE EXIST TRACKS
NEW TRACK
NEW SIDEWALK & CURB FOR BUS DROP OFF AREA
99TH AVENUE
RETAIN EXISTING TRACK
FARMERS BLVD.
194TH STREET
PLAN VIEW OF HOLLIS STATION
SCALE IN FEET
CANOPY SUPPORT
RELOCATED BYPASS TRACK
EXISTING BYPASS TRACK
TRACK NO. 4
EXISTING STAIR TREAD
NEW SUPPORT FOR PLATFORM WIDENING
MAINTAIN EXISTING HEIGHT
SECTION A-A (AT EXISTING STAIRWAY)
RECESSED LIGHT (TYP)
NEW PLATFORM SUPPORT
RETAIN EXISTING PLATFORM SUPPORT
EXISTING GROUND
SECTION B-B
LEGEND
EXISTING PLATFORM
PLATFORM WIDENING
TRACK CENTERLINE
PROPERTY LINE
BUILDING LINE
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
SUBWAY/LIRR MONTAUK TRANSFER
PLAN OF HOLLIS STATION
AS NOTED
MT-005-1

Figure A. 9-7

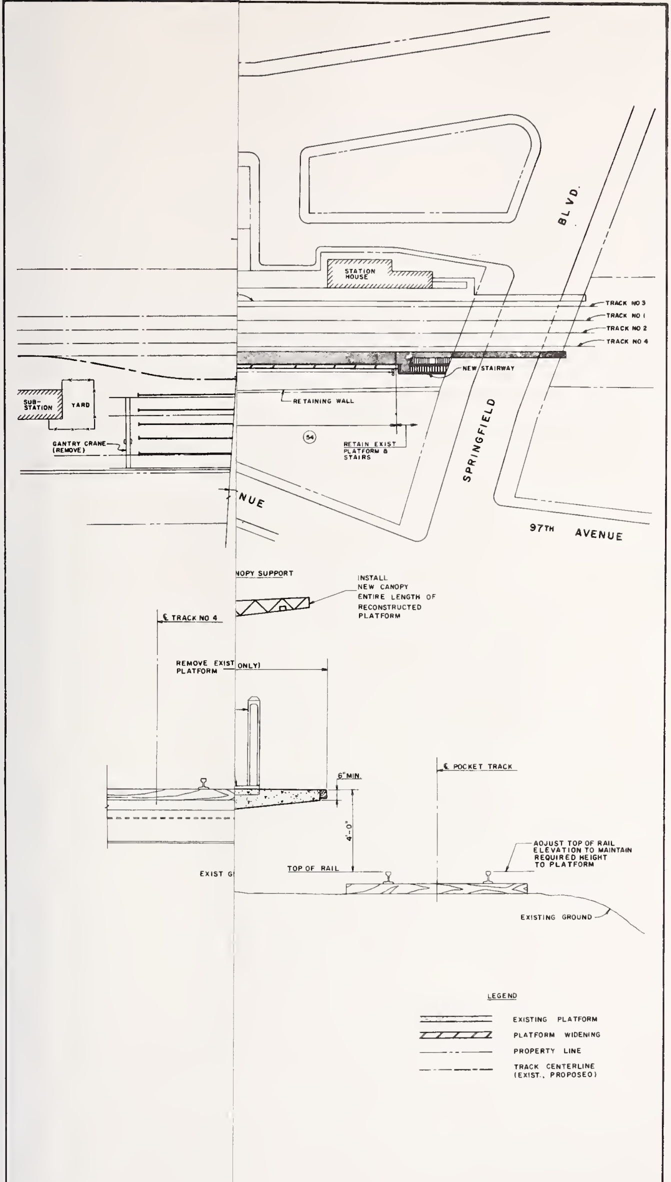


Figure A. 9-8

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

SUBWAY/LIRR MONTAUK TRANSFER
PLAN OF QUEENS VILLAGE STATION

DATE: 1-27-84
SCALE: AS NOTED
PREPARED BY VOLLMER ASSOCIATES
DRAWING NUMBER MT-QOS-2

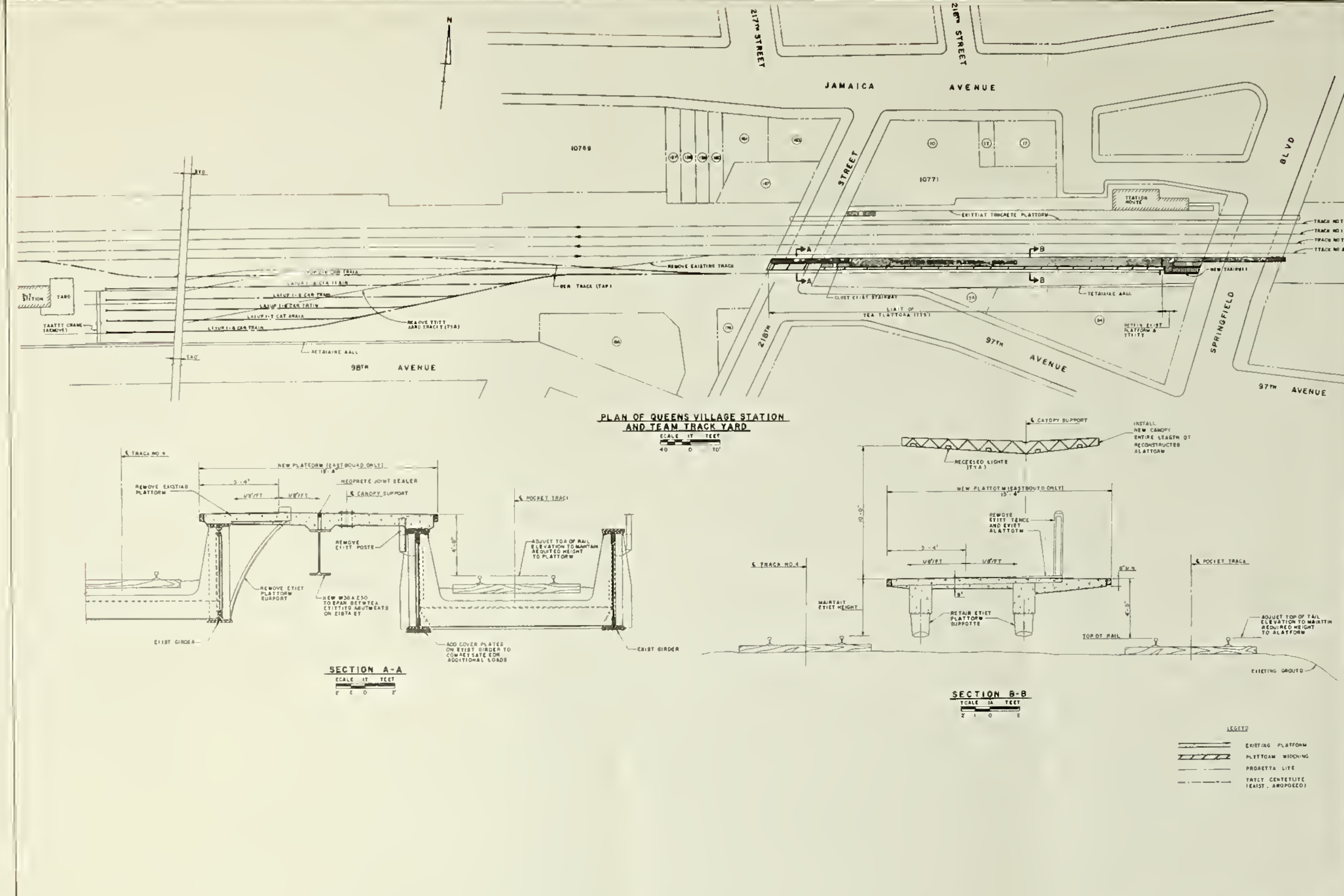


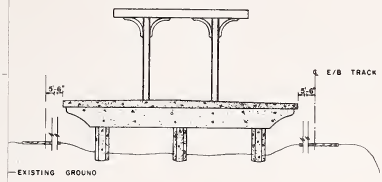
Figure A. 9-8

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

SUBWAY/LIRR MONTAUK TRANSFER
PLAN OF QUEENS VILLAGE STATION

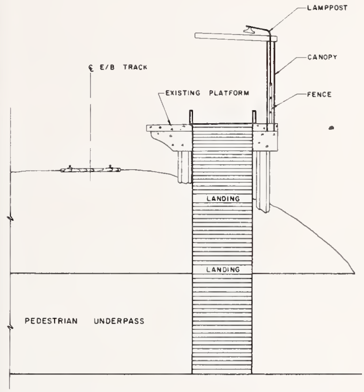
SCALE: AS NOTED

MT-003-2



SECTION A-A

SCALE IN FEET
2' 1' 0 2'



PARTIAL SECTION B-B

SCALE IN FEET
2' 1' 2'

NOTE
LAURELTON STATION IS VERY SIMILAR IN ALIGNMENT AND STRUCTURE AS SHOWN IN THE ROSEDALE STATION

Figure A. 9-9

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC. / AKRF, INC.
VOLLMER ASSOCIATES / BARTON-ASCHMAN ASSOCIATES, INC.

SUBWAY/L.I.R.R. MONTAUK TRANSFER
PLAN AND TYPICAL SECTION OF ROSEDALE, LAURELTON AND LOCUST MANOR

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-QO8-3
SCALE: AS NOTED		

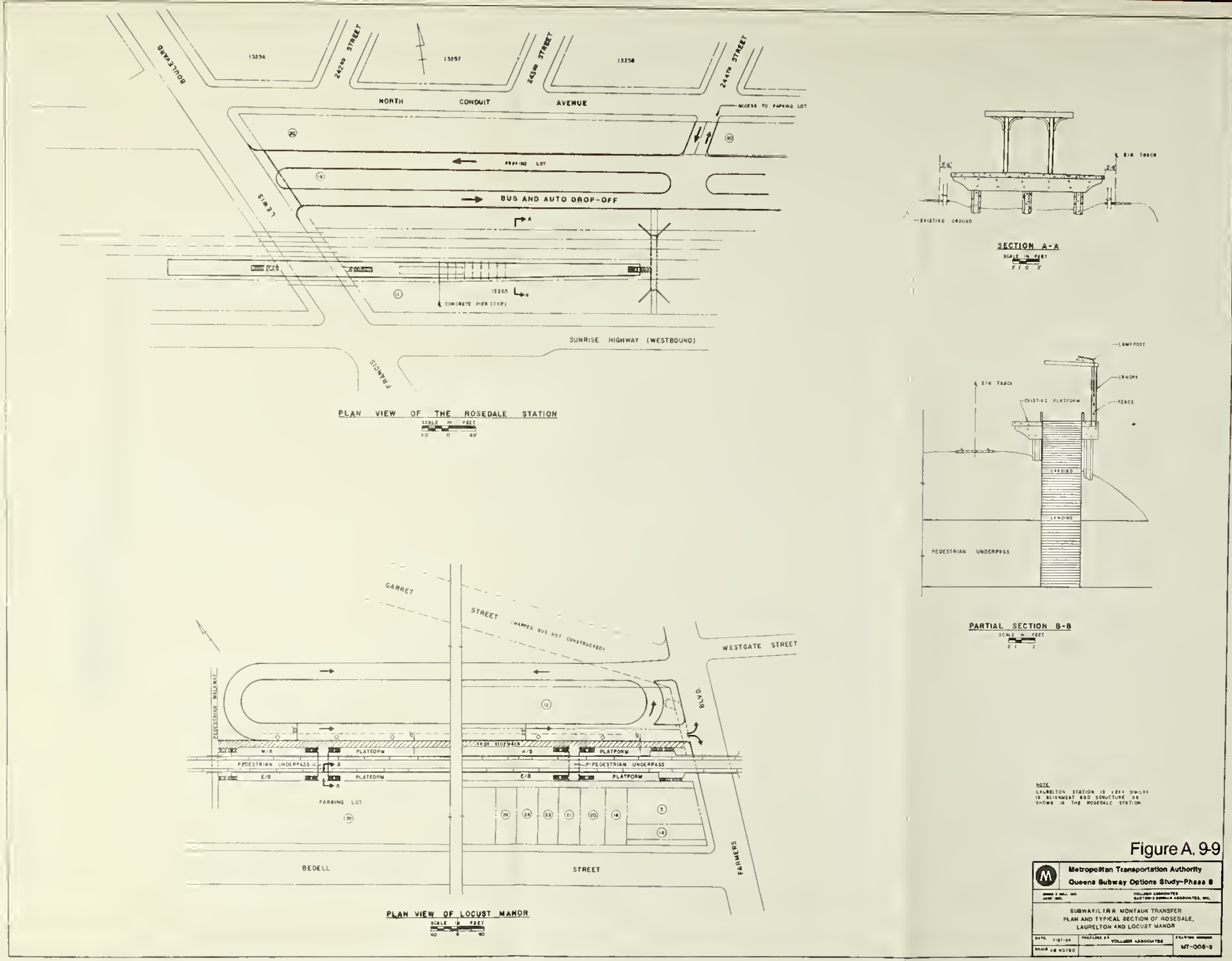
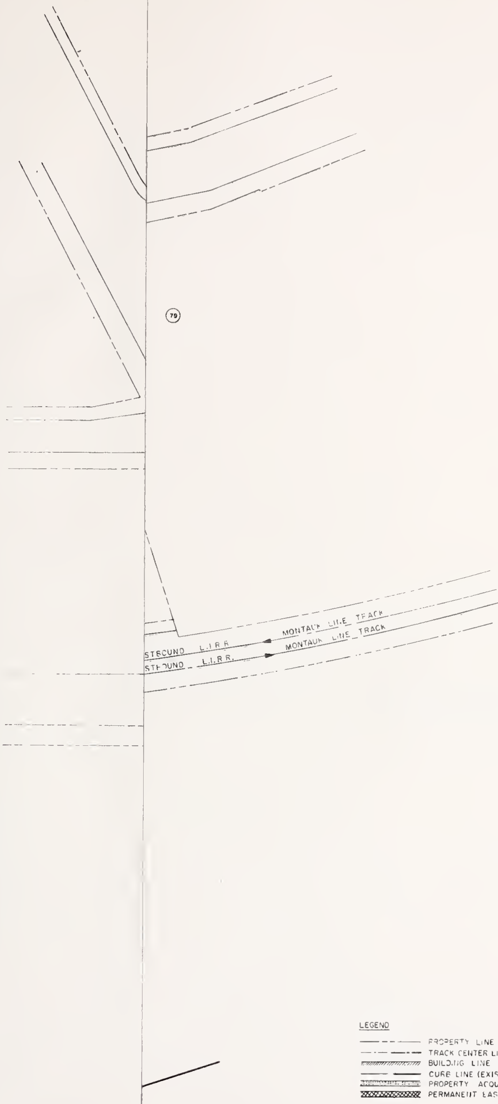

BOULEVARD
242ND STREET
243RD STREET
244TH STREET
13256
13257
13258
NORTH CONDUIT AVENUE
ACCESS TO PARKING LOT
PARKING LOT
BUS AND AUTO DROP-OFF
LEWIS
13265
CONCRETE PIER (TYP)
SUNRISE HIGHWAY (WESTBOUND)
FRANCIS
PLAN VIEW OF THE ROSEDALE STATION
SCALE IN FEET
SECTION A-A
SCALE IN FEET
E/B TRACK
EXISTING GROUND
LAMPPOST
CANOPY
FENCE
E/B TRACK
EXISTING PLATFORM
GROUND
LANDING
PEDESTRIAN UNDERPASS
PARTIAL SECTION B-B
SCALE IN FEET
GARRET STREET (MAPPED BUT NOT CONSTRUCTED)
WESTGATE STREET
BLVD.
PEDESTRIAN WALKWAY
W/B PLATFORM
PEDESTRIAN UNDERPASS
E/B PLATFORM
PARKING LOT
BEDELL STREET
FARMERS
PLAN VIEW OF LOCUST MANOR
SCALE IN FEET
NOTE
LAURELTON STATION IS VERY SIMILAR IN ALIGNMENT AND STRUCTURE AS SHOWN IN THE ROSEDALE STATION
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
SUBWAY/L.I.R.R. MONTAUK TRANSFER
PLAN AND TYPICAL SECTION OF ROSEDALE, LAURELTON AND LOCUST MANOR
SCALE AS NOTED
VOLLMER ASSOCIATES
MT-006-3

Figure A. 9-9



LEGEND

PROPERTY LINE
TRACK CENTER LINE (EXIST. & PROP.)
BUILDING LINE
CURB LINE (EXIST. & PROP.)
PROPERTY ACQUISITION
PERMANENT EASEMENT

SCALE IN FEET
40' 0 40'

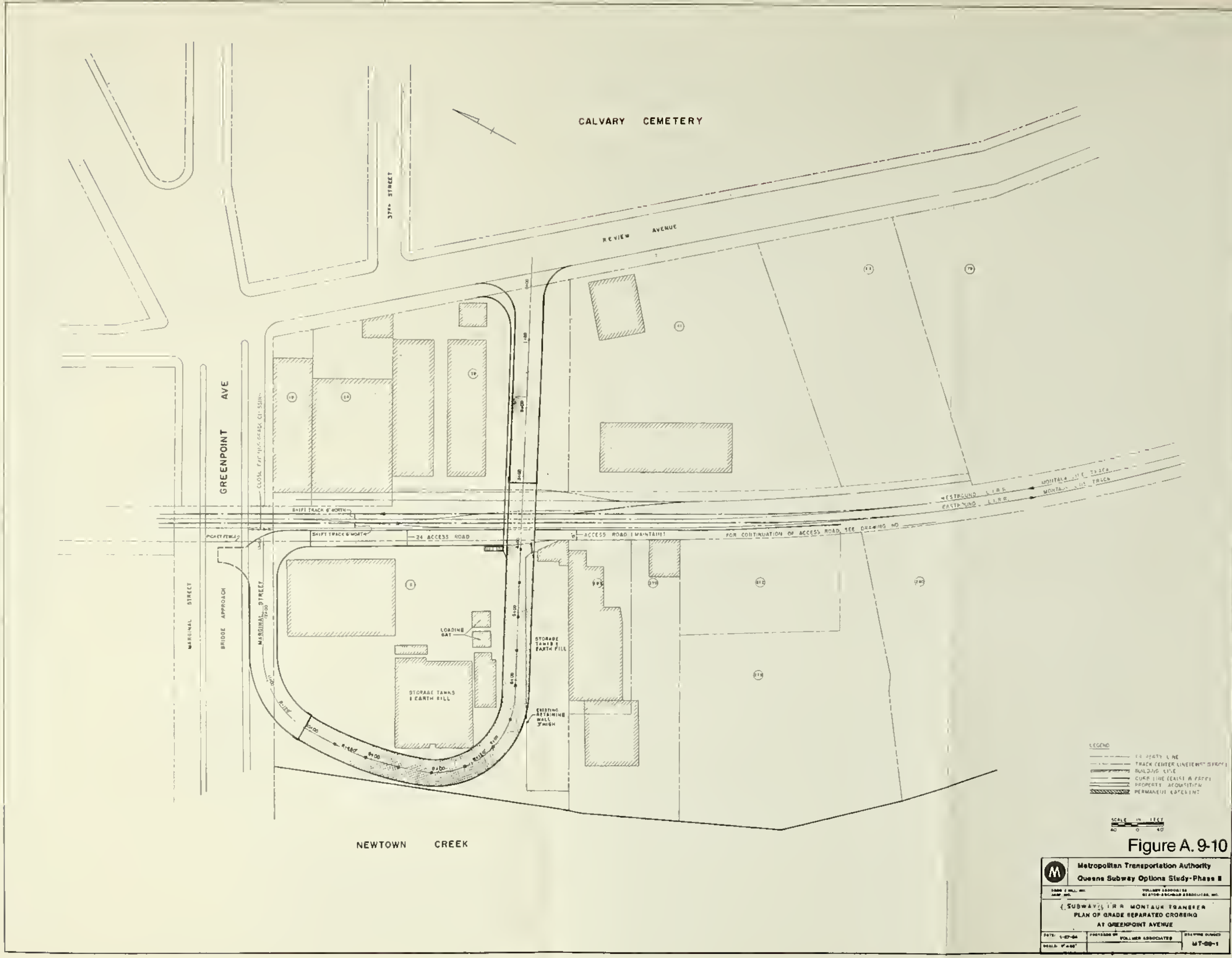
Figure A. 9-10

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC.
AKRF, INC.
VOLLMER ASSOCIATES
BARTON-ASCHMAN ASSOCIATES, INC.

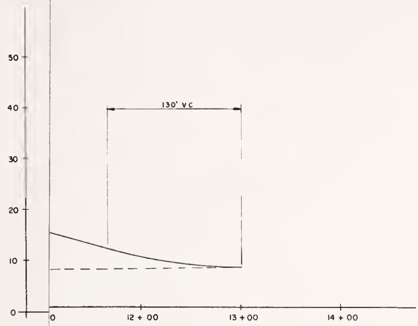
SUBWAY/L.I.R.R. MONTAUK TRANSFER
PLAN OF GRADE SEPARATED CROSSING
AT GREENPOINT AVENUE

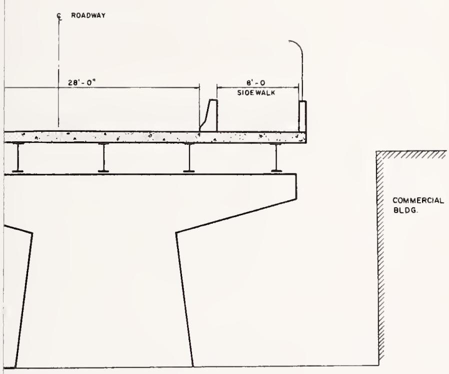
DATE: 1-27-84
SCALE: 1" = 40'
PREPARED BY VOLLMER ASSOCIATES
DRAWING NUMBER MT-GG-1



CALVARY CEMETERY
REVIEW AVENUE
37TH STREET
GREENPOINT AVE
MARGINAL STREET
BRIDGE APPROACH
ACCESS ROAD
LOADING BAY
STORAGE TANKS & EARTH FILL
NEWTOWN CREEK
WESTBOUND L.I.R.R.
EASTBOUND L.I.R.R.
SCALE IN FEET
40 0 40
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
SUBWAY/L.I.R.R. MONTAUK TRANSFER
PLAN OF GRADE SEPARATED CROSSING
AT GREENPOINT AVENUE

Figure A. 9-10





SECTION A–A

ECTION AT MASPETH AVE. G. S. CROSSING

SCALE IN FEET

2' 1' 0 2'

Figure A. 9-11

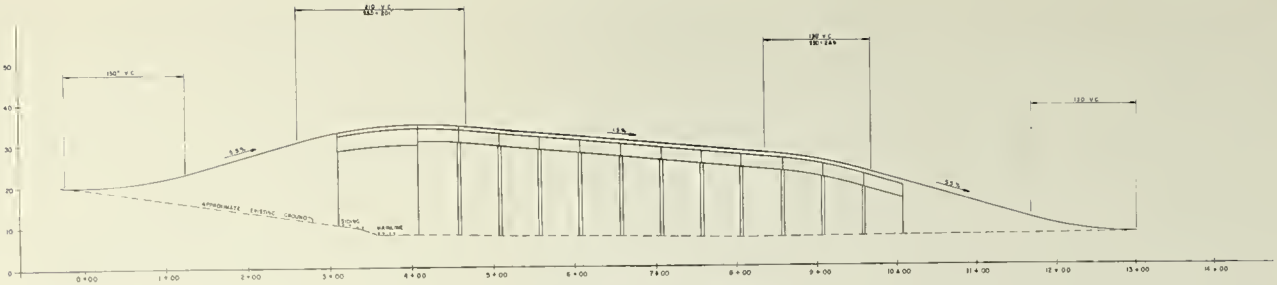
M	Metropolitan Transportation Authority Queens Subway Options Study–Phase II

GIBBS & HILL, INC
AKRF, INC.

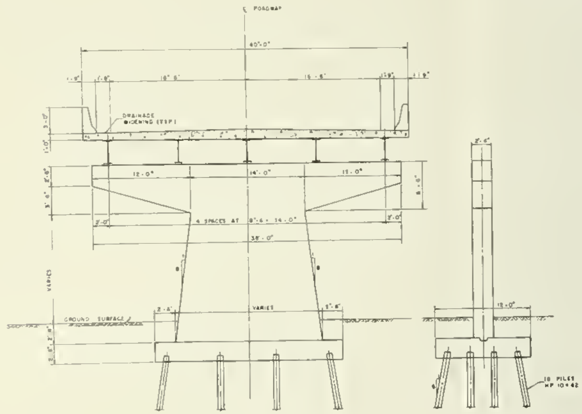
VOLLMER ASSOCIATES
BARTON-ASCHMAN ASSOCIATES, INC.

SUBWAY/L I R R MONTAUK TRANSFER
PROFILE OF GREENPOINT AVE. G. S. CROSSING,
TYPICAL SECTION AT MASPETH AVE., AND PIER DETAIL

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-GS-2
SCALE: AS NOTED		

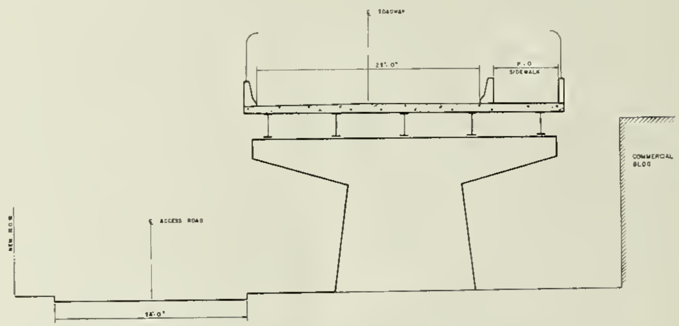


PROFILE - GREENPOINT AVE. G.S. CROSSING



DETAIL OF PIER

SCALE IN FEET



SECTION A-A

TYPICAL SECTION AT MASPETH AVE. G. S. CROSSING

SCALE IN FEET

Figure A. 9-11

Metropolitan Transportation Authority

Queens Subway Options Study-Phase II

SUBWAY/L.I.R.R. MONTAUK TRANSFER

PROFILE OF GREENPOINT AVE. G. S. CROSSING, TYPICAL SECTION AT MASPETH AVE., AND PIER DETAIL

DATE: 1-27-84

PREPARED BY VOLLMER ASSOCIATES

SCALE: AS NOTED

DRAWING NUMBER MT-GS-2

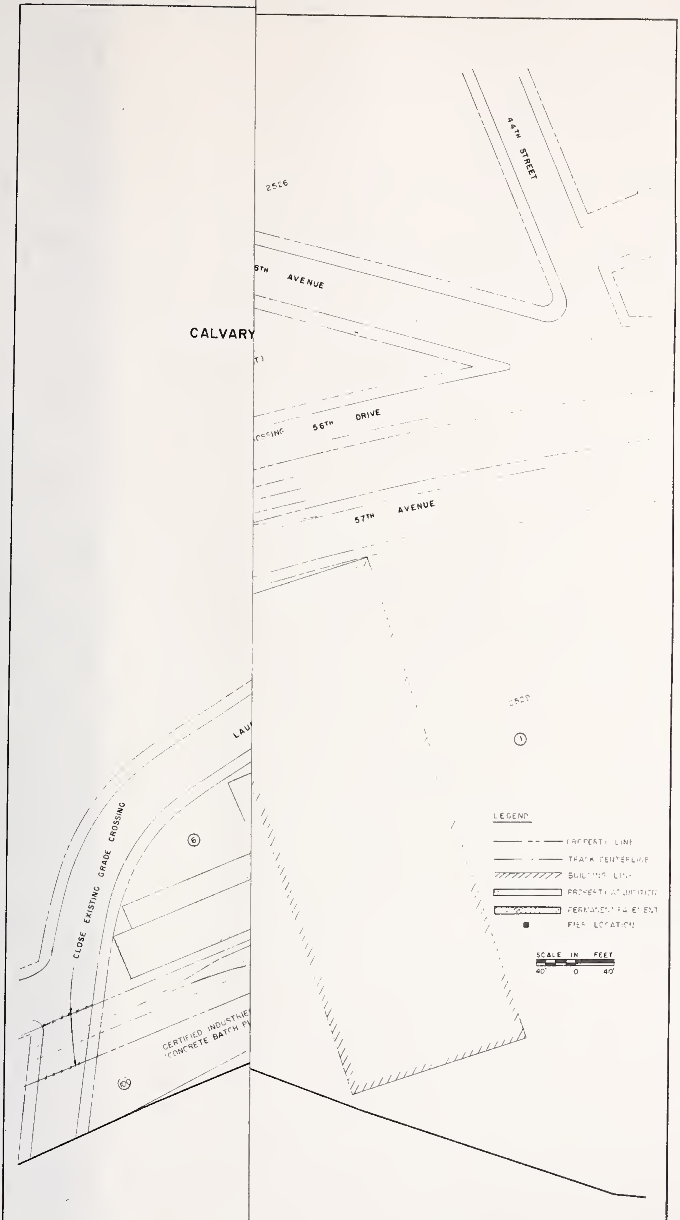


Figure A. 9-12

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC. / AKRF, INC. — VOLLMER ASSOCIATES / BARTON-ASCHMAN ASSOCIATES, INC.

SUBWAY/L I R R MONTAUK TRANSFER
PLAN OF GRADE SEPARATED CROSSING
AT LAUREL HILL BLVD/43RD STREET

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-GS-3
SCALE: 1"=40'		

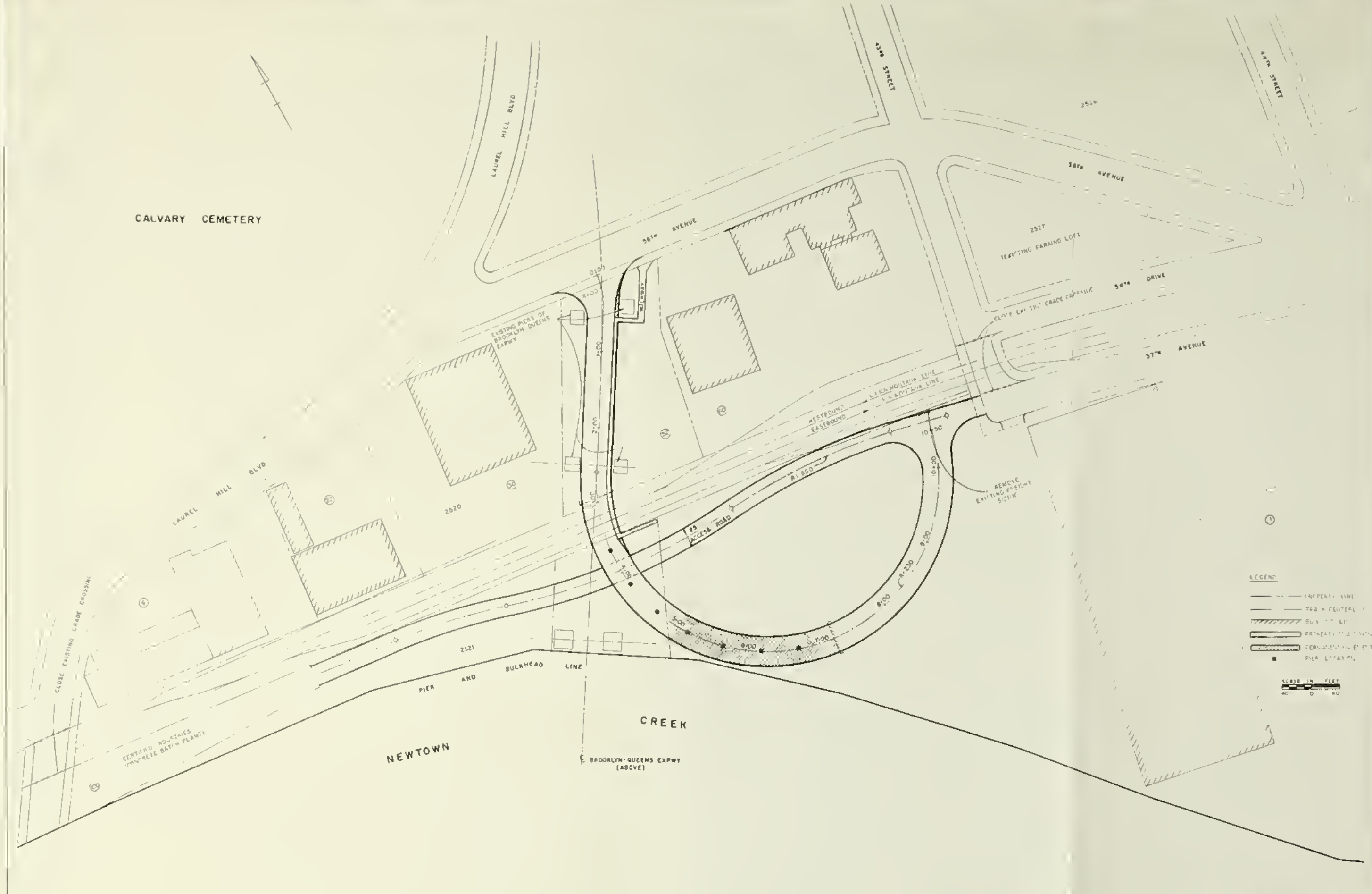


Figure A. 9-12

Metropolitan Transportation Authority
Queens Subway Options Study–Phase II

SUBWAY/L I R R MONTAUK TRANSFER
PLAN OF GRADE SEPARATED CROSSING
AT LAUREL HILL BLVD/43RD STREET

PREPARED BY VOLLMER ASSOCIATES

MT-GS-3

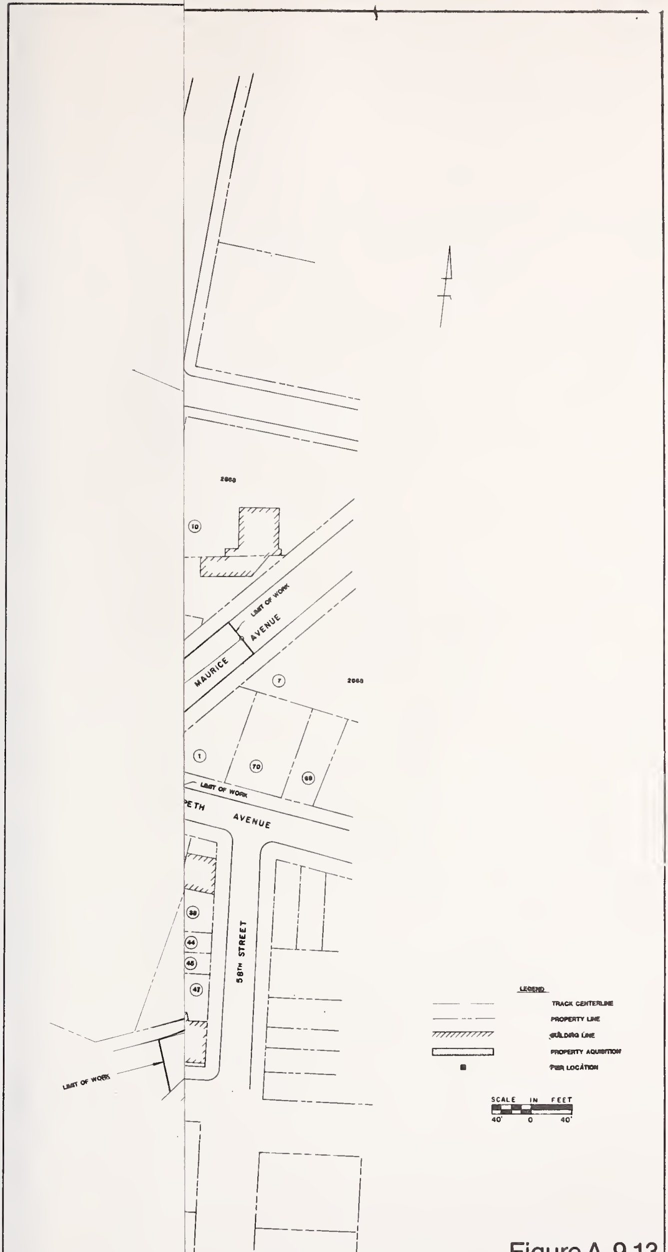


Figure A. 9-13

Metropolitan Transportation Authority

SUBWAY/L.I.R.R. MONTAUK TRANSFER


56TH STREET
58TH DRIVE
RUST STREET
58TH TERRACE
58TH STREET
MAURICE AVENUE
MASPETH AVENUE
LIMIT OF WORK
RUST STREET
57TH PLACE
57TH ROAD
MASPETH AVENUE
CONSTRUCT ACCESS ROAD
RELOCATED FREIGHT TRACK
SEE DRAWING MA GS-2
LIMIT OF WORK
58TH STREET
Metropolitan Transportation Authority
Queens Subway Options Study Phase II
SUBWAY/L/R.R MONTAUK TRANSFER

Figure A. 9-13

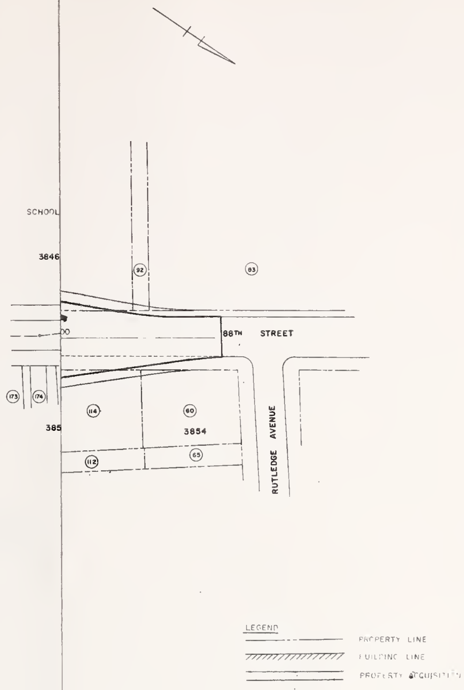


Figure A. 9-14

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC.
AKRF, INC.

VOLLMER ASSOCIATES
BARTON-ASCHMAN ASSOCIATES, INC.

SUBWAY/L I R R MONTAUK TRANSFER
PLAN OF GRADE SEPARATED CROSSING
AT 88TH STREET

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MT-GS-7
SCALE: 1"=40'		

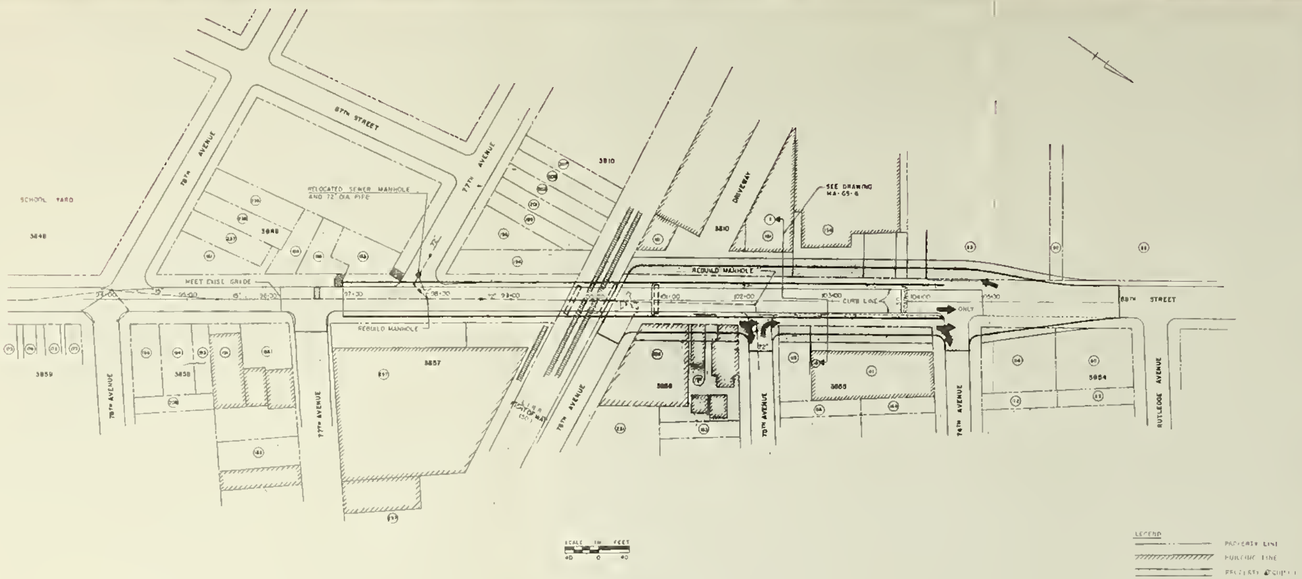


Figure A. 9-14

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

SUBWAY/L I R R MONTAUK TRANSFER
PLAN OF GRADE SEPARATED CROSSING
AT 88TH STREET

DATE: 1-27-94 | PREPARED BY VOLLMER ASSOCIATES | DRAWING NUMBER MT-GS-7

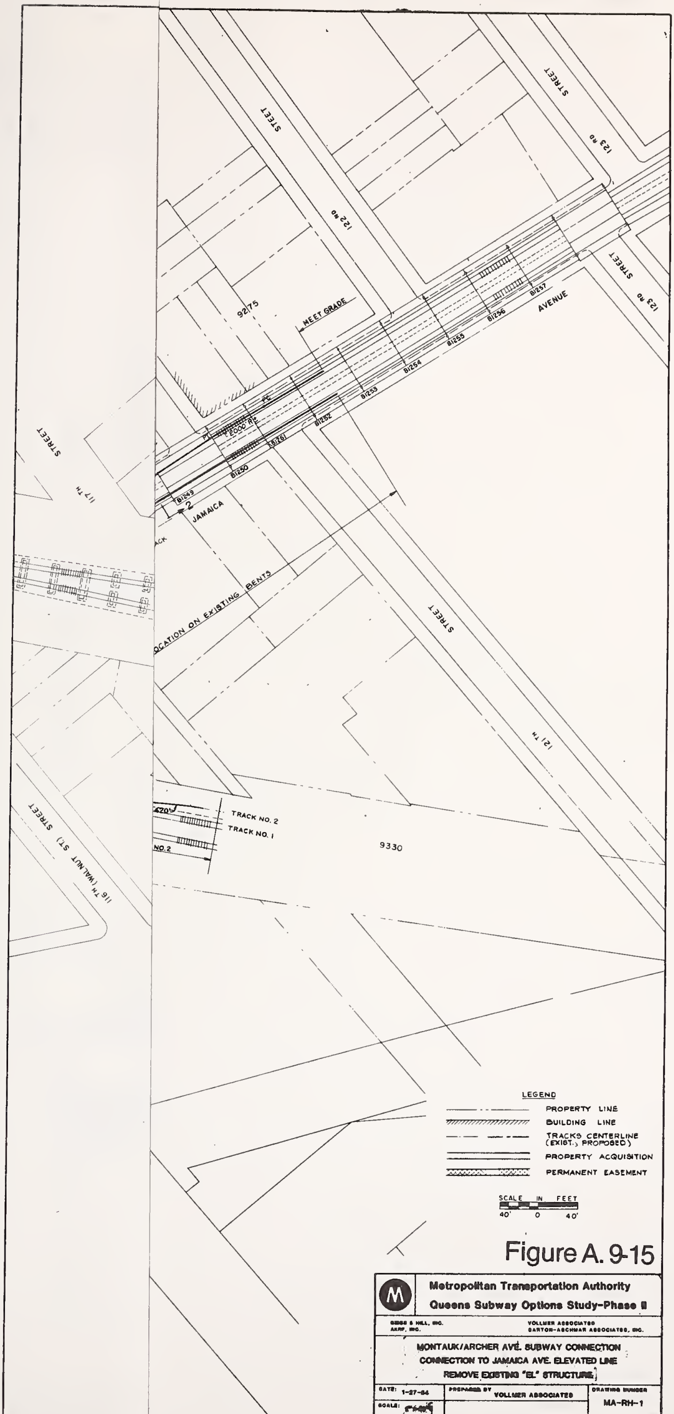

123 RD STREET
122 ND STREET
123 RD STREET
92175
MEET GRADE
AVENUE
B1249
B1250
B1251
B1252
B1253
B1254
B1255
B1256
B1257
2000' R
JAMAICA
117 TH STREET
OCATION ON EXISTING BENTS
121 ST STREET
TRACK NO. 2
TRACK NO. 1
NO. 2
9330
116 TH (WALNUT ST) STREET
LEGEND
PROPERTY LINE
BUILDING LINE
TRACKS CENTERLINE (EXIST., PROPOSED)
PROPERTY ACQUISITION
PERMANENT EASEMENT
SCALE IN FEET
40' 0 40'
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
VOLLMER ASSOCIATES
MONTAUK/ARCHER AVE. SUBWAY CONNECTION
CONNECTION TO JAMAICA AVE. ELEVATED LINE
REMOVE EXISTING "EL" STRUCTURE
DATE: 1-27-84
PREPARED BY VOLLMER ASSOCIATES
DRAWING NUMBER MA-RH-1
SCALE:

Figure A. 9-15

Figure A. 9-15

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

MONTAUK/ARCHER AVE. SUBWAY CONNECTION
CONNECTION TO JAMAICA AVE. ELEVATED LINE
REMOVE EXISTING "EL" STRUCTURE

PREPARED BY VOLLMER ASSOCIATES
DRAWING NUMBER MA-RH-1

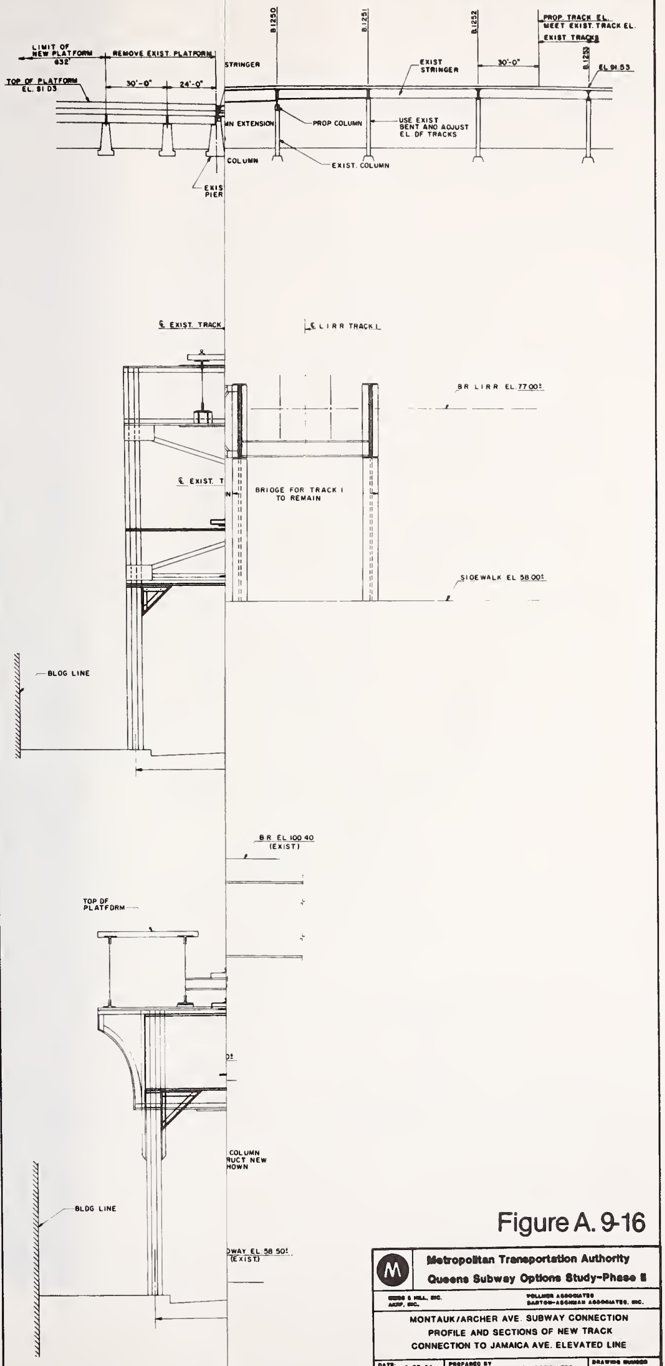


Figure A. 9-16

Metropolitan Transportation Authority

Queens Subway Options Study-Phase II

VOLLMER ASSOCIATES

MONTAUK/ARCHER AVE. SUBWAY CONNECTION
PROFILE AND SECTIONS OF NEW TRACK
CONNECTION TO JAMAICA AVE. ELEVATED LINE

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MA-RH-2
SCALE: AS NOTED		

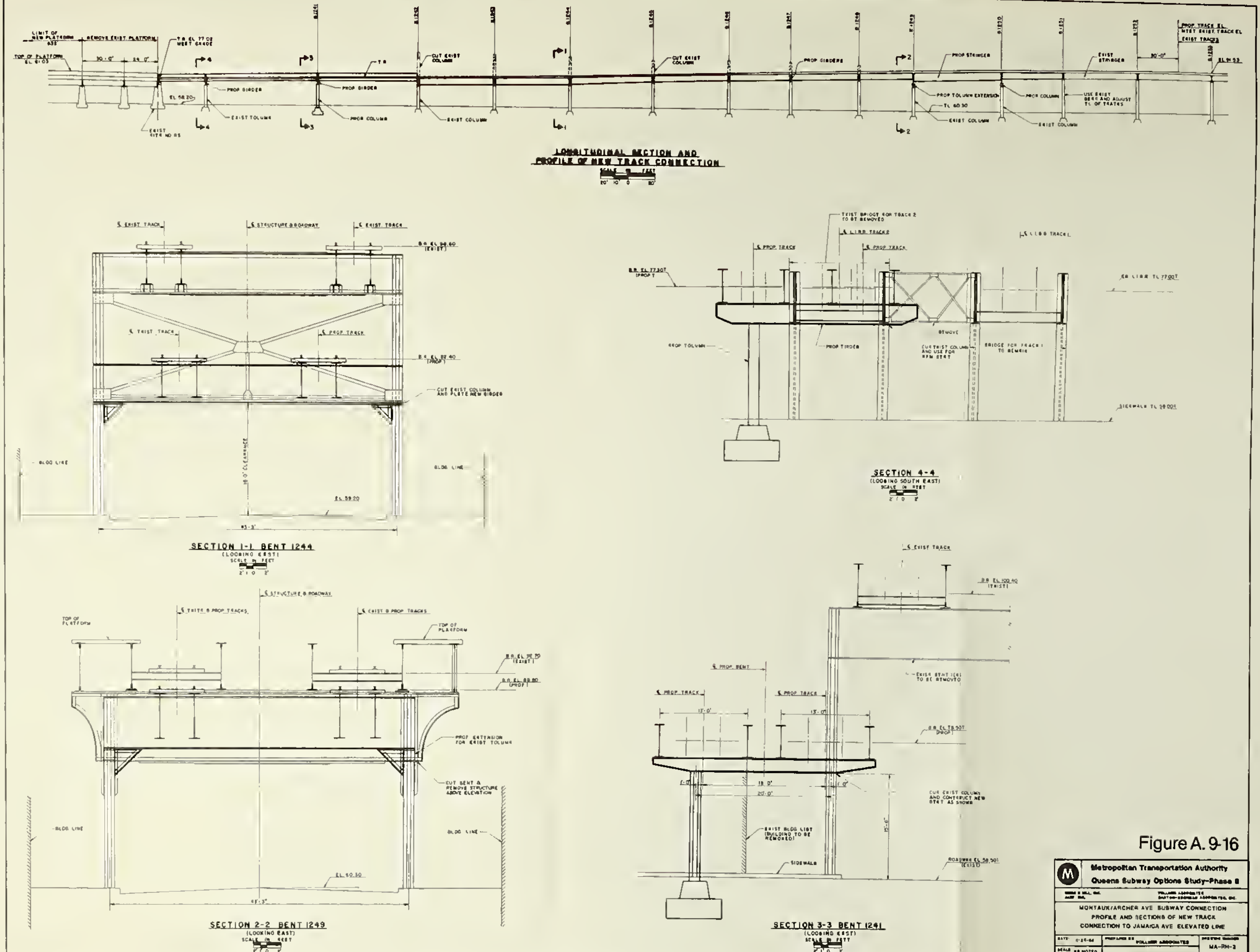

LONGITUDINAL SECTION AND PROFILE OF NEW TRACK CONNECTION
SECTION 1-1 BENT 1244
(LOOKING EAST)
SECTION 4-4
(LOOKING SOUTH EAST)
SECTION 2-2 BENT 1249
(LOOKING EAST)
SECTION 3-3 BENT 1241
(LOOKING EAST)
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
MONTAUK/ARCHER AVE SUBWAY CONNECTION
PROFILE AND SECTIONS OF NEW TRACK
CONNECTION TO JAMAICA AVE ELEVATED LINE
MA-RH-3

Figure A. 9-16

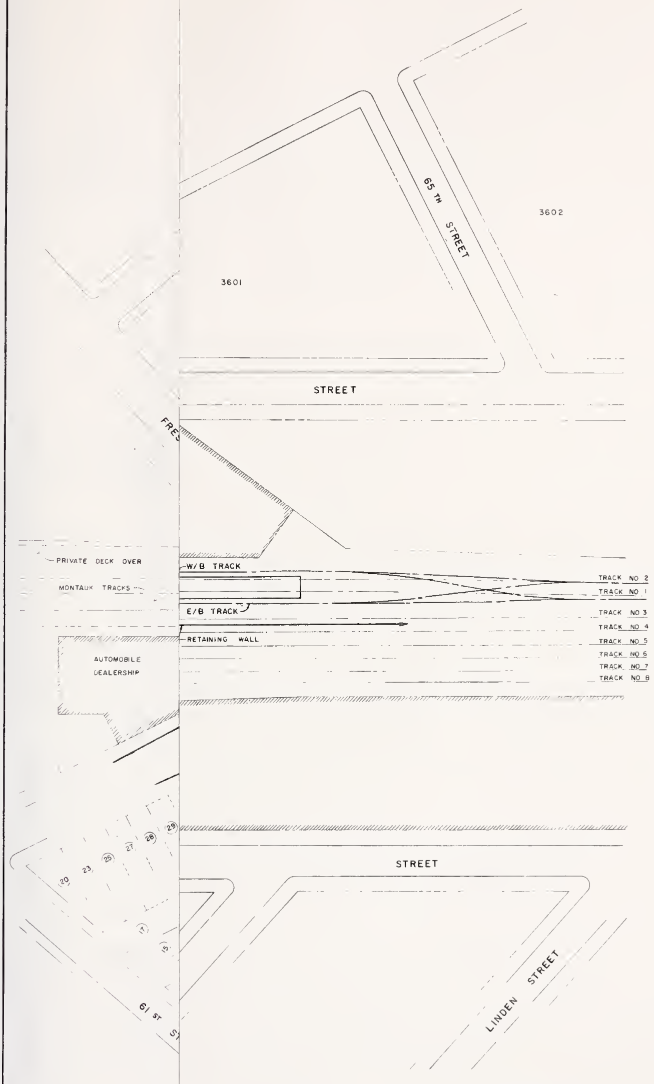


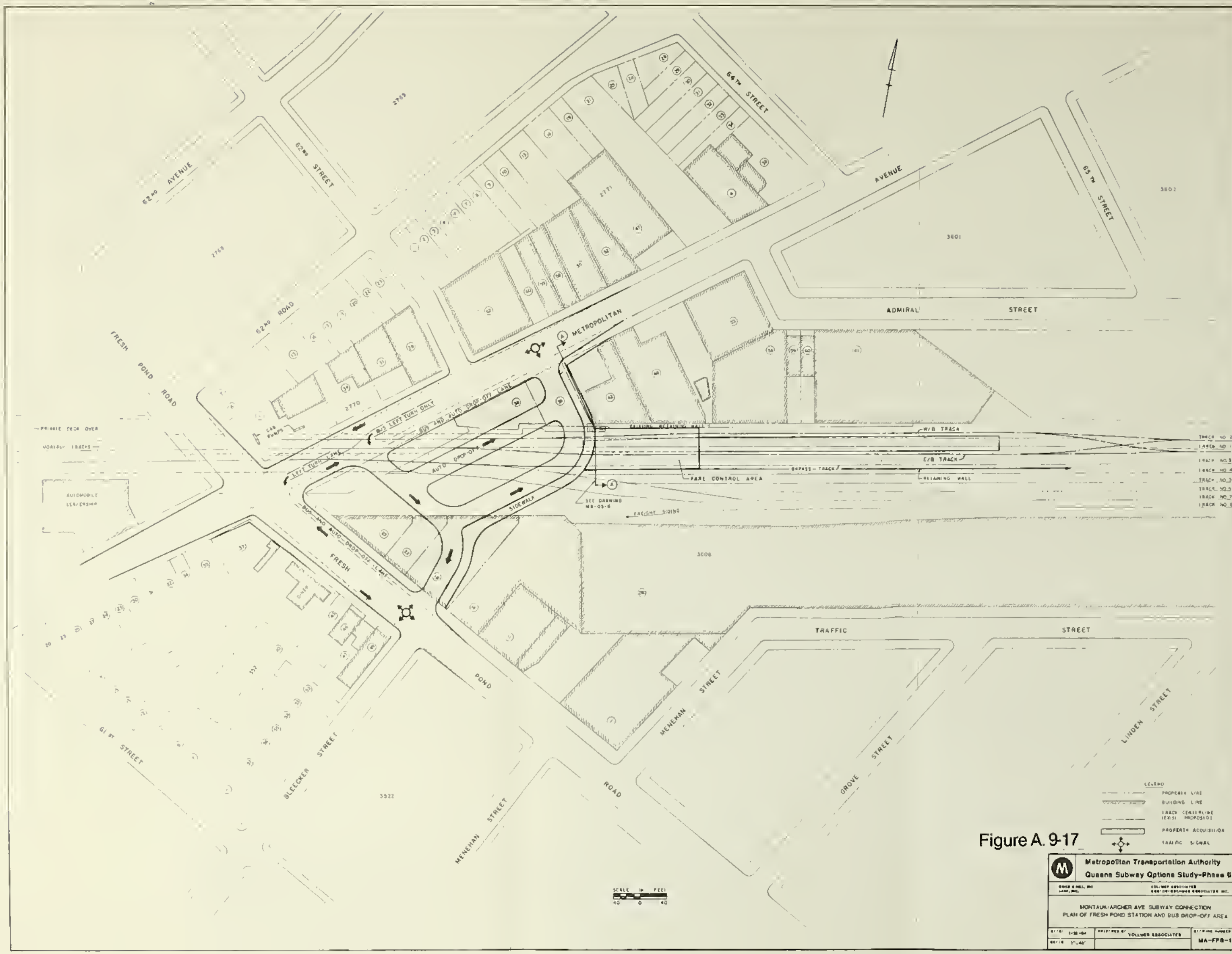
Figure A. 9-17

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC / AKRF, INC. — VOLLMER ASSOCIATES / BARTON-ASCHMAN ASSOCIATES, INC.

MONTAUK/ARCHER AVE. SUBWAY CONNECTION
PLAN OF FRESH POND STATION AND BUS DROP-OFF AREA

DATE: 1-27-84	PREPARED BY VOLLMER ASSOCIATES	DRAWING NUMBER MA-FPS-1
SCALE: 1"=40'		



62ND AVENUE
62ND STREET
64TH STREET
METROPOLITAN AVENUE
65TH STREET
ADMIRAL STREET
62ND ROAD
FRESH POND ROAD
BUS LEFT TURN ONLY
BUS AND AUTO DROP-OFF LANE
AUTO DROP-OFF
LEFT TURN LANE
SIDEWALK
EXISTING RETAINING WALL
W/B TRACK
E/B TRACK
BYPASS TRACK
FARE CONTROL AREA
RETAINING WALL
FREIGHT SIDING
TRACK NO. 2
TRACK NO. 1
TRACK NO. 3
TRACK NO. 4
TRAFFIC STREET
MENEHAN STREET
GROVE STREET
LINDEN STREET
61ST STREET
BLEECKER STREET
SCALE IN FEET
LEGEND
PROPERTY LINE
BUILDING LINE
PROPERTY ACQUISITION
TRAFFIC SIGNAL
Metropolitan Transportation Authority
Queens Subway Options Study-Phase II
MONTAUK/ARCHER AVE SUBWAY CONNECTION
PLAN OF FRESH POND STATION AND BUS DROP-OFF AREA
VOLLMER ASSOCIATES
MA-FPS-1

Figure A. 9-17

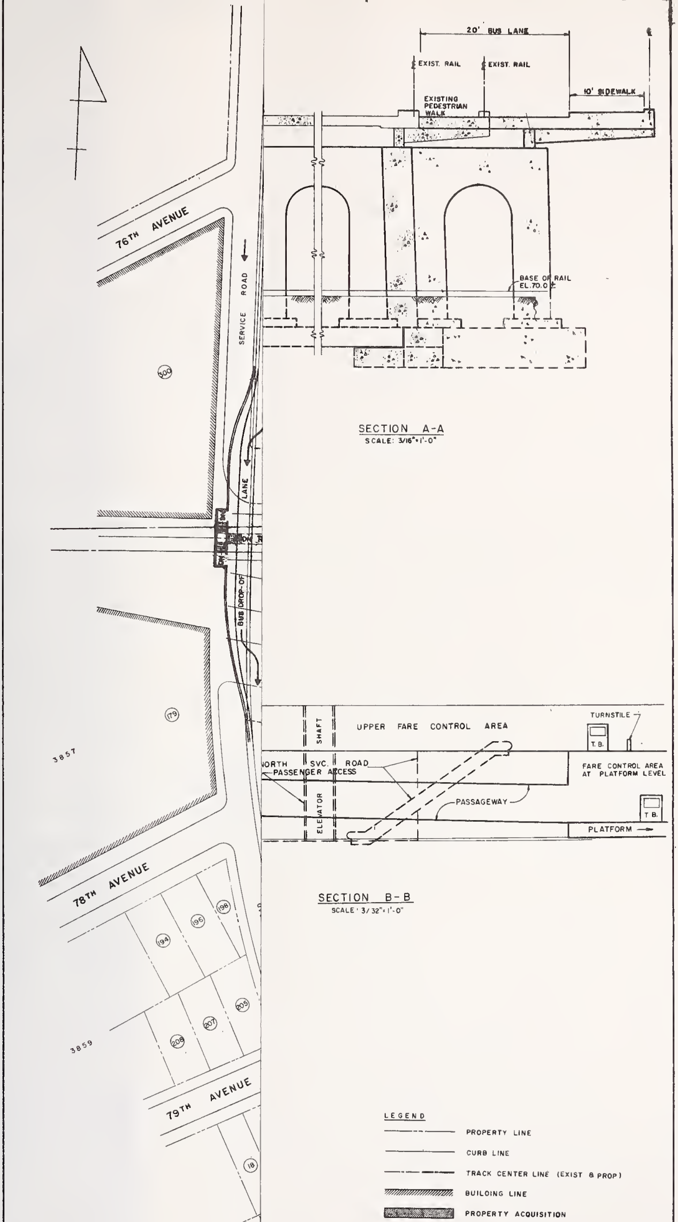


Figure A. 9-18

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

MOUNTAUK/ARCHER AVE. SUBWAY CONNECTION
PLAN OF WOODHAVEN BLVD. STATION

DATE: 1-27-84
PREPARED BY VOLLMER ASSOCIATES

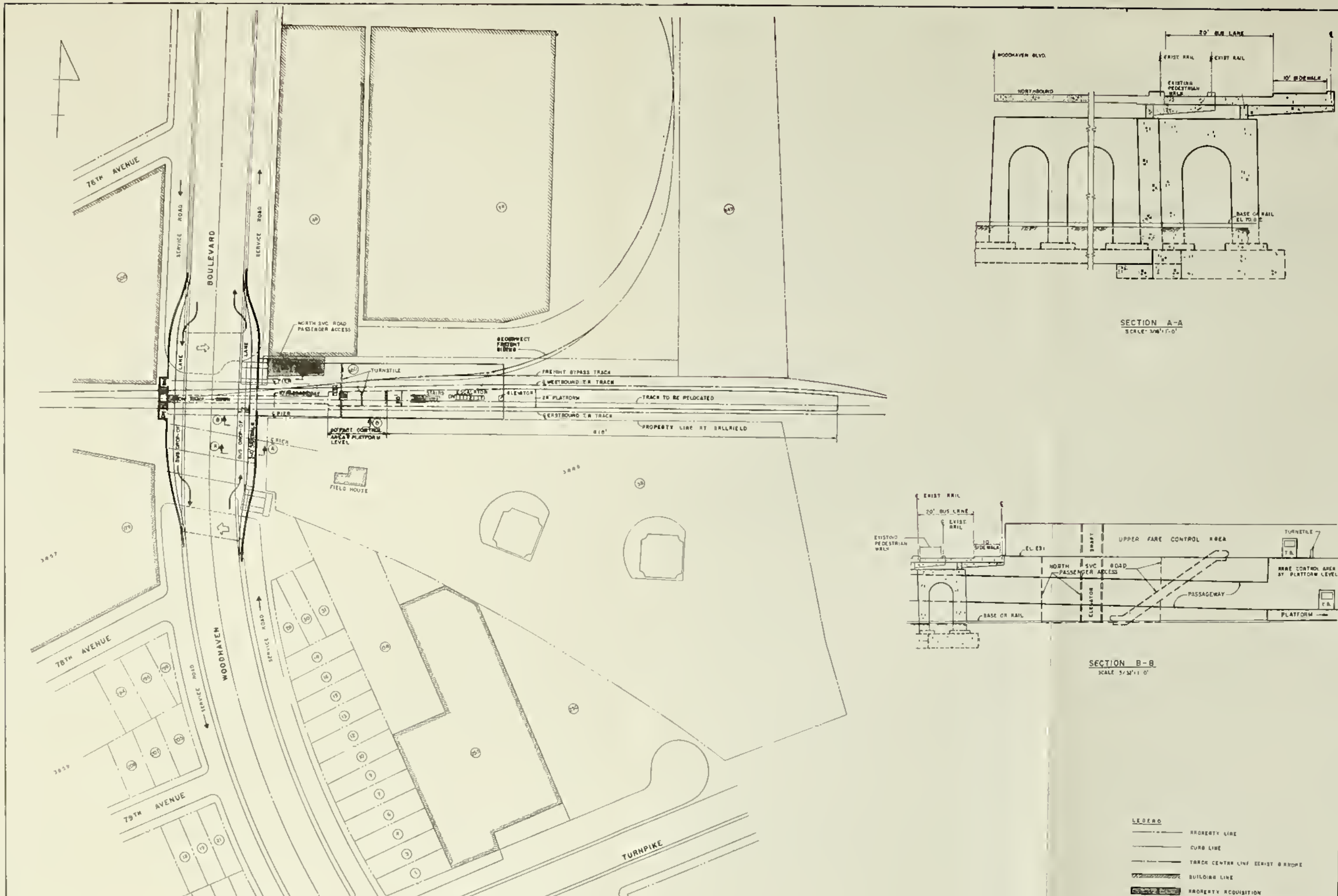


Figure A. 9-18

Metropolitan Transportation Authority
Queens Subway Options Study–Phase II

MOUNTAUK/ARCHER AVE. SUBWAY CONNECTION
PLAN OF WOODHAVEN BLVD. STATION

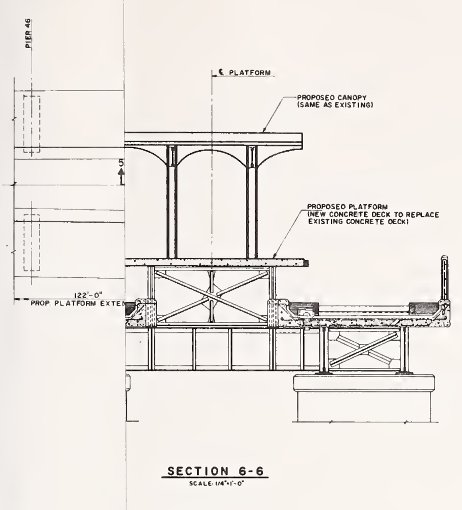
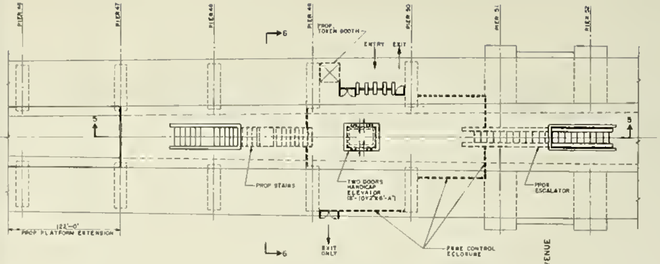


Figure A. 9-19

Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

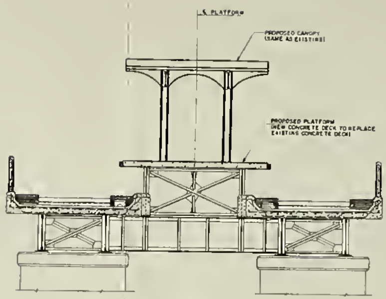
MONTAUK/ARCHER AVE. SUBWAY CONNECTION
DETAIL PLAN AND SECTIONS OF
PROPOSED RICHMOND HILL STATION

DATE: 1-27-84 | PREPARED BY VOLLMER ASSOCIATES | DRAWING NUMBER MA-RH-3
SCALE: AS NOTED

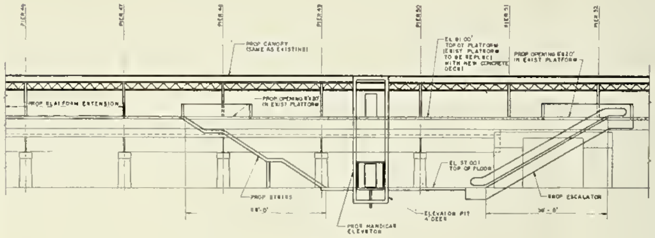


PLAN OF FARE CONTROL

(WEST SIDE OF STATION)



SECTION 6-6



SECTION 5-5

Figure A. 9-19

Metropolitan Transportation Authority	
Queens Subway Options Study–Phase II	
MONTAUK/ARCHER AVE. SUBWAY CONNECTION DETAIL PLAN AND SECTIONS OF PROPOSED RICHMOND HILL STATION	
DATE: 1-07-84	PREPARED BY VOLLMER ASSOCIATES
SCALE: AS NOTED	DRAWING NUMBER MA-RH-3

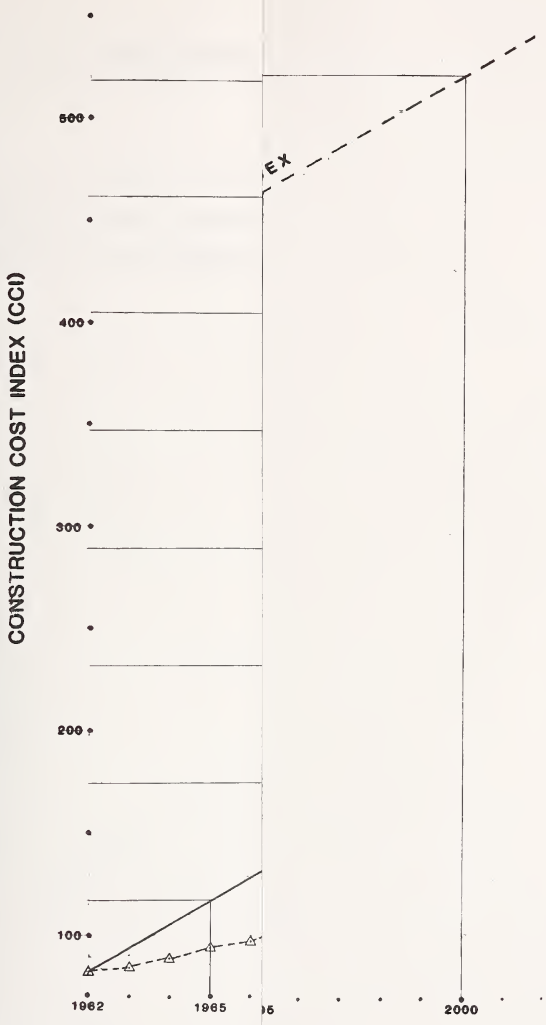


Figure A. 9-20

Description	Figure
ENR CONTRUCTION COST INDEX– ISTORICAL DATA AND TREND	A. 9-20

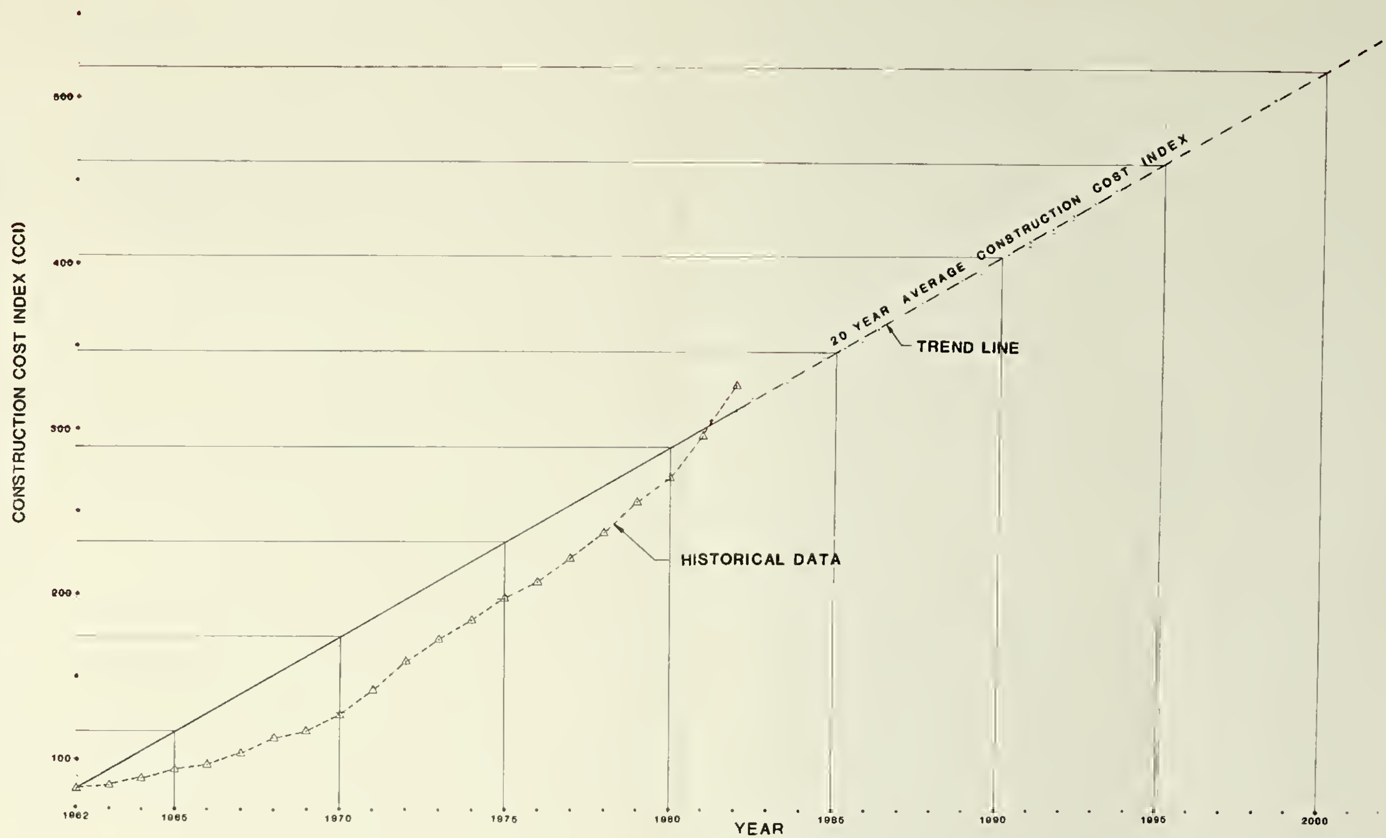
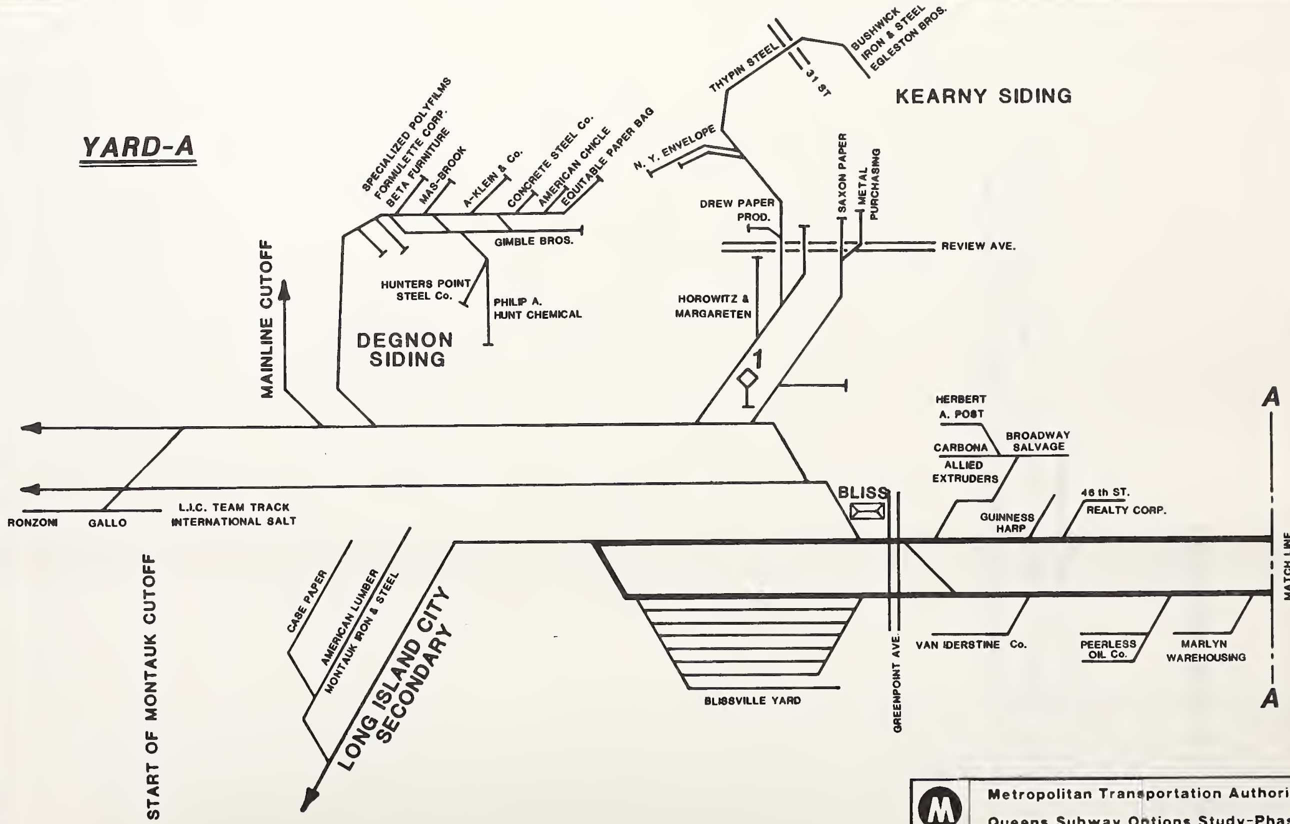


Figure A. 9-20

	Queens Subway Options Study - Phase II	Description ENR CONTRUCTION COST INDEX- HISTORICAL DATA AND TREND	Figure A. 9-20

Appendix A.10 Track Schematics



Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

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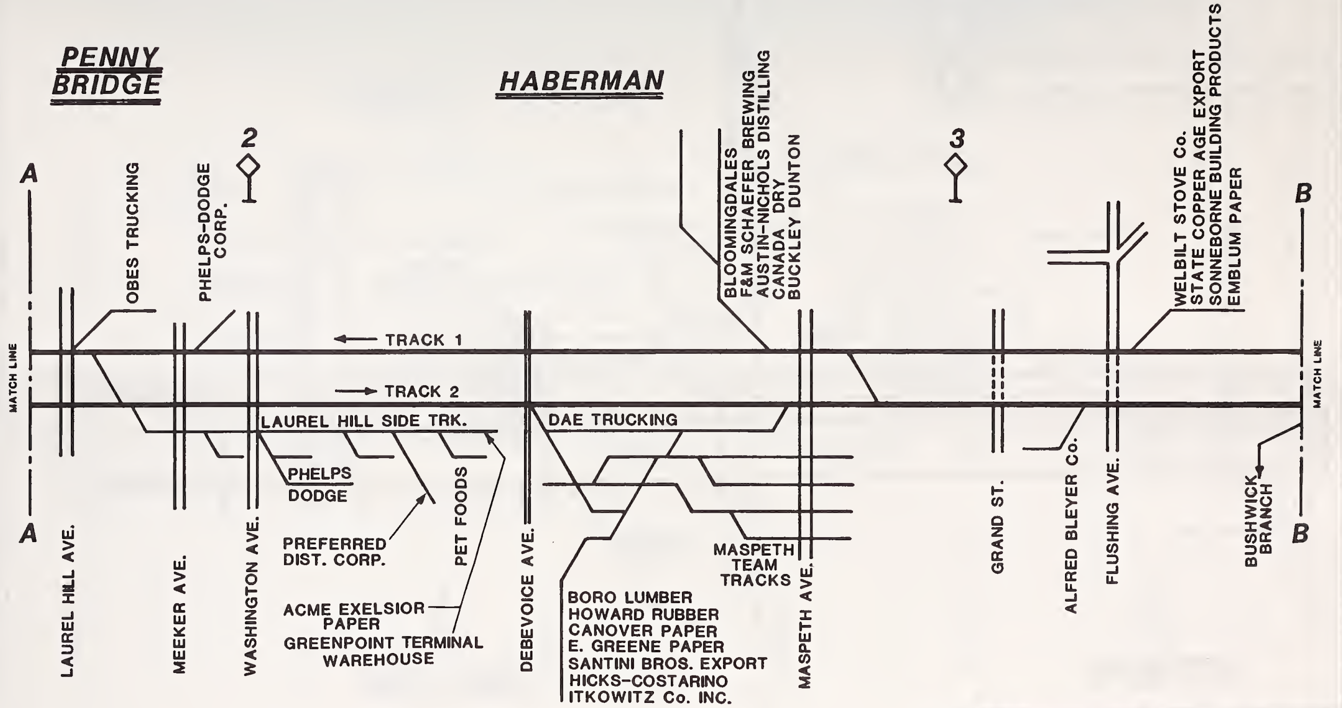
AKRF INC — BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch-Track Schematic
Existing Track Arrangement

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-1



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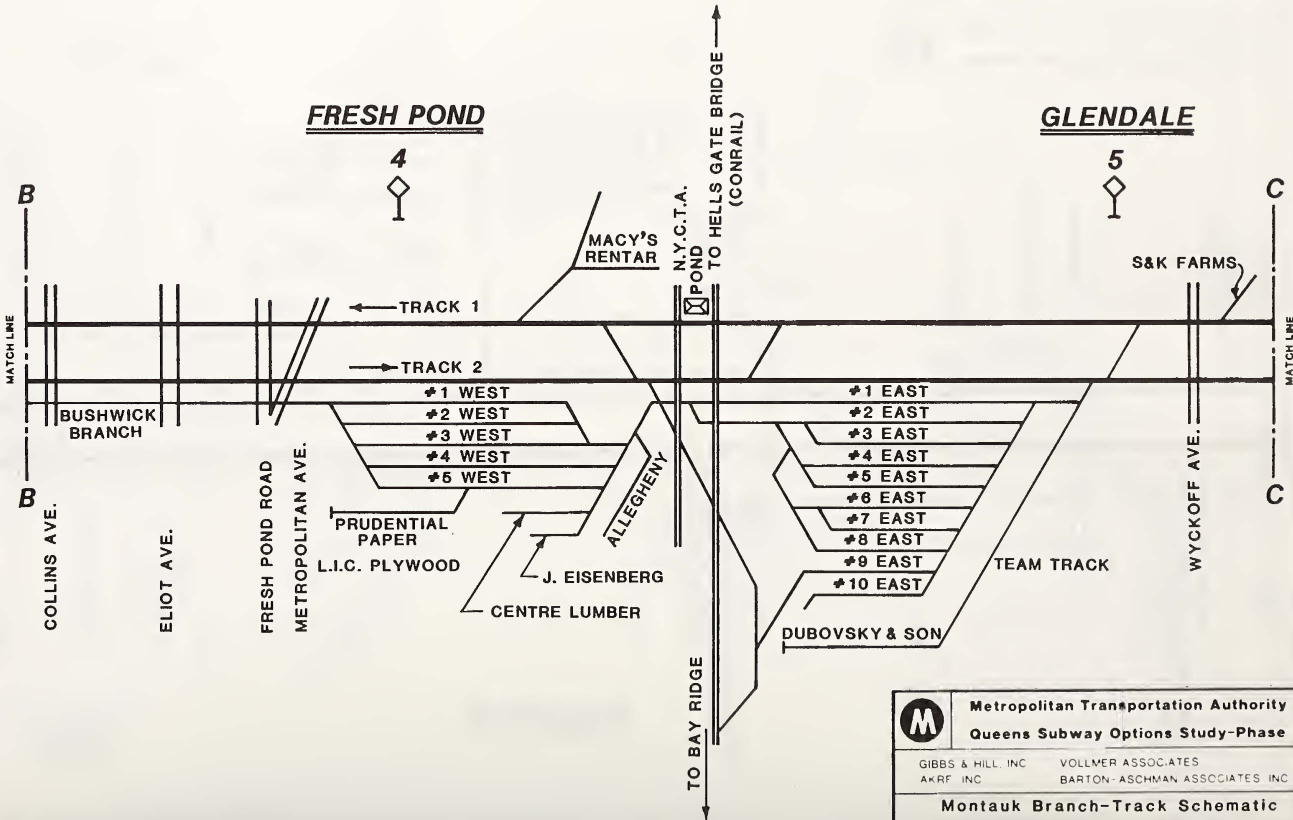
AKRF INC   BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch-Track Schematic
Existing Track Arrangement

HORIZONTAL SCALE: 1"=1000'   FIG. A.10-1



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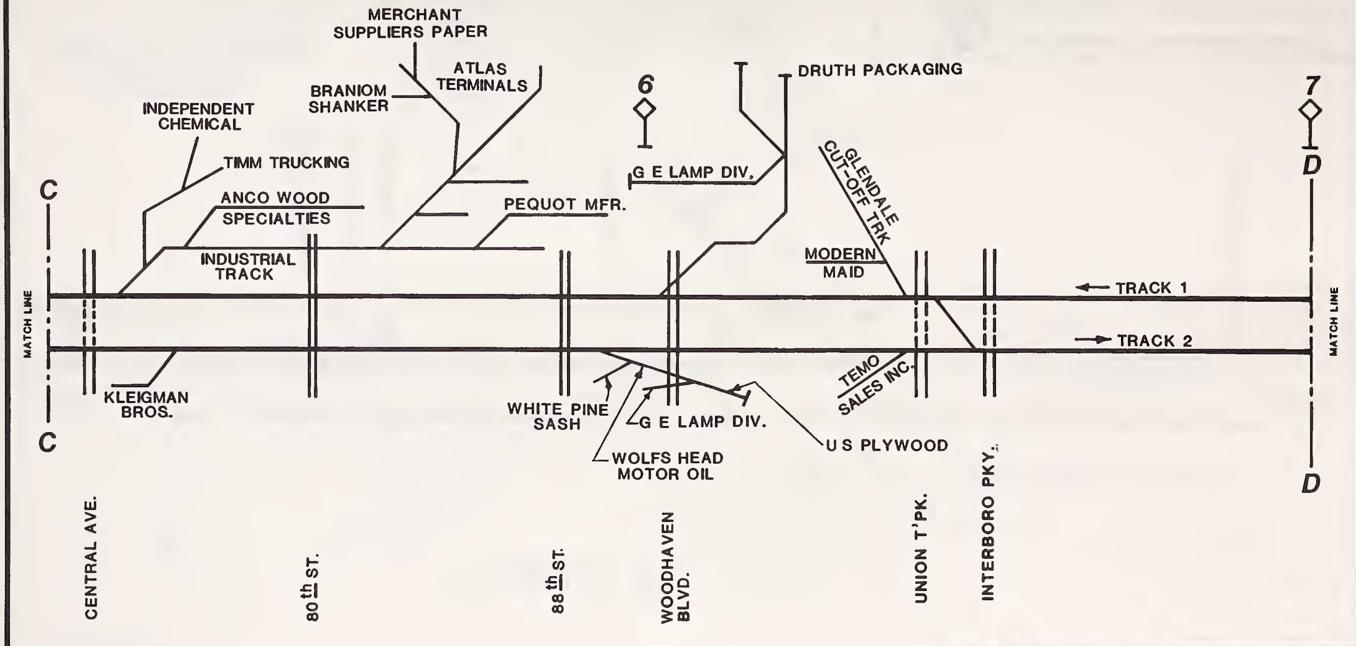
AKRF INC — BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch-Track Schematic
Existing Track Arrangement

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-1



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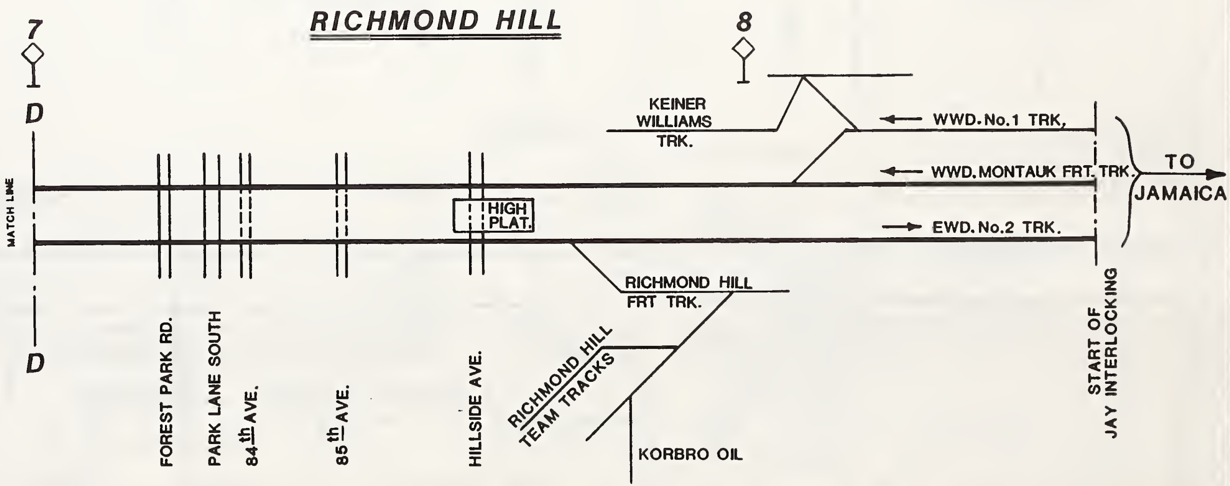
AKRF INC | BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch-Track Schematic
Existing Track Arrangement

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-1



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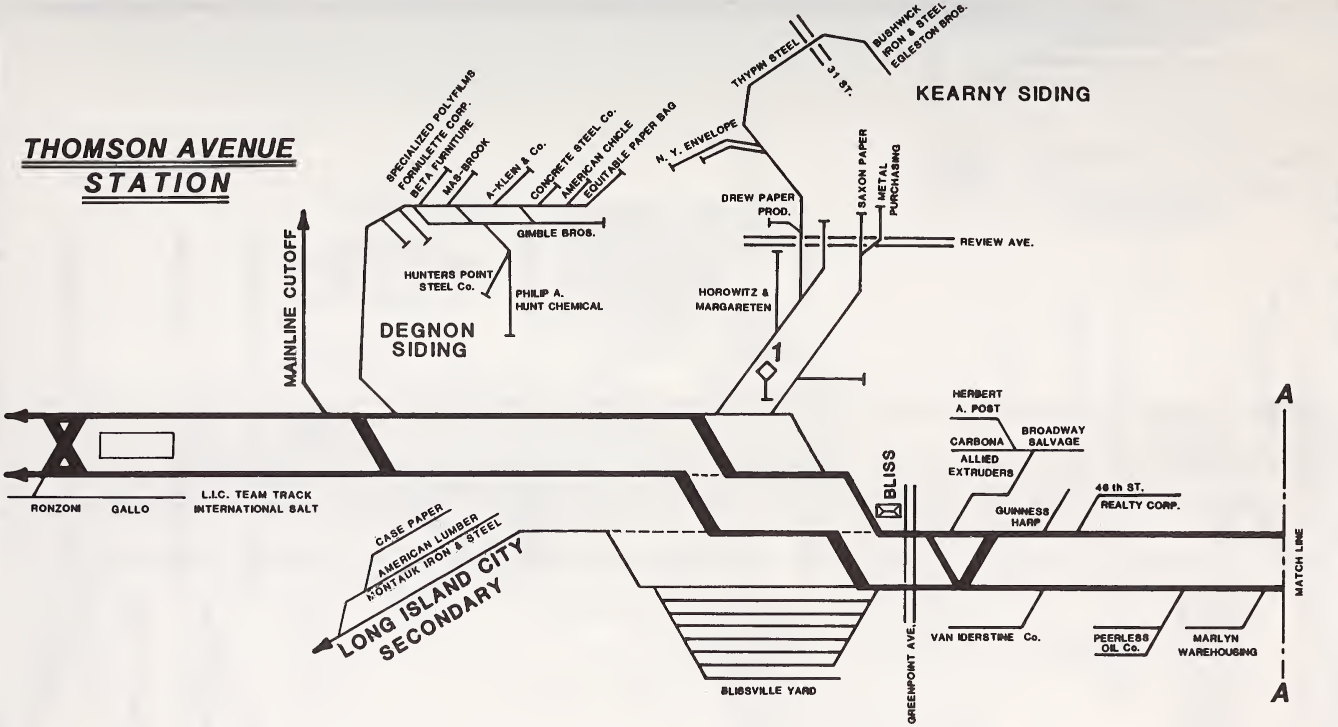
AKRF INC — BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch-Track Schematic
Existing Track Arrangement

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-1



LEGEND:

- Existing tracks to remain non-electrified
- Existing tracks to be electrified
- Tracks to be added
- Tracks to be removed
- Tower
- Milepost

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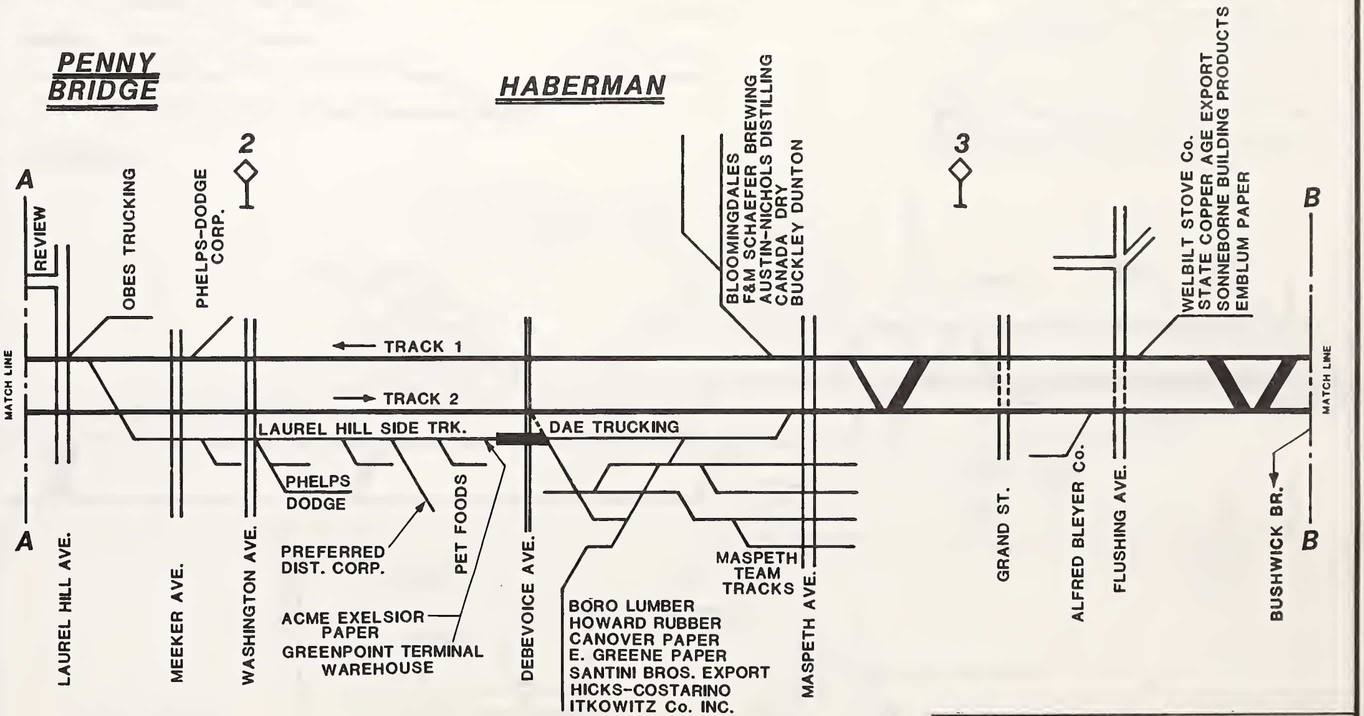
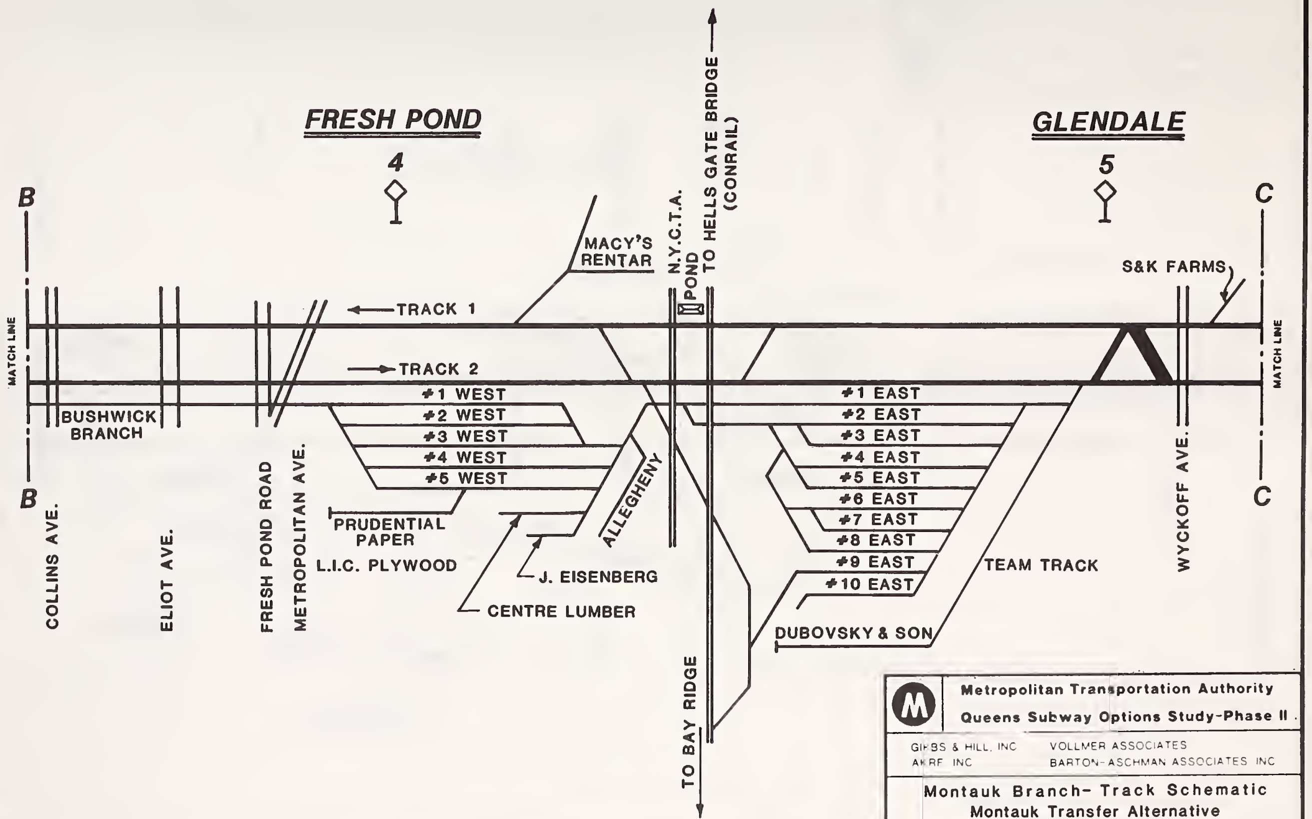
AKRF INC BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch- Track Schematic
Montauk Transfer Alternative
Track Modifications

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-2



Metropolitan Transportation Authority Queens Subway Options Study-Phase II	
GIBBS & HILL, INC AKRF INC	VOLLMER ASSOCIATES BARTON-ASCHMAN ASSOCIATES INC
Montauk Branch- Track Schematic Montauk Transfer Alternative Track Modifications	
HORIZONTAL SCALE: 1"=1000'	FIG. A.10-2



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Queens Subway Options Study-Phase II.

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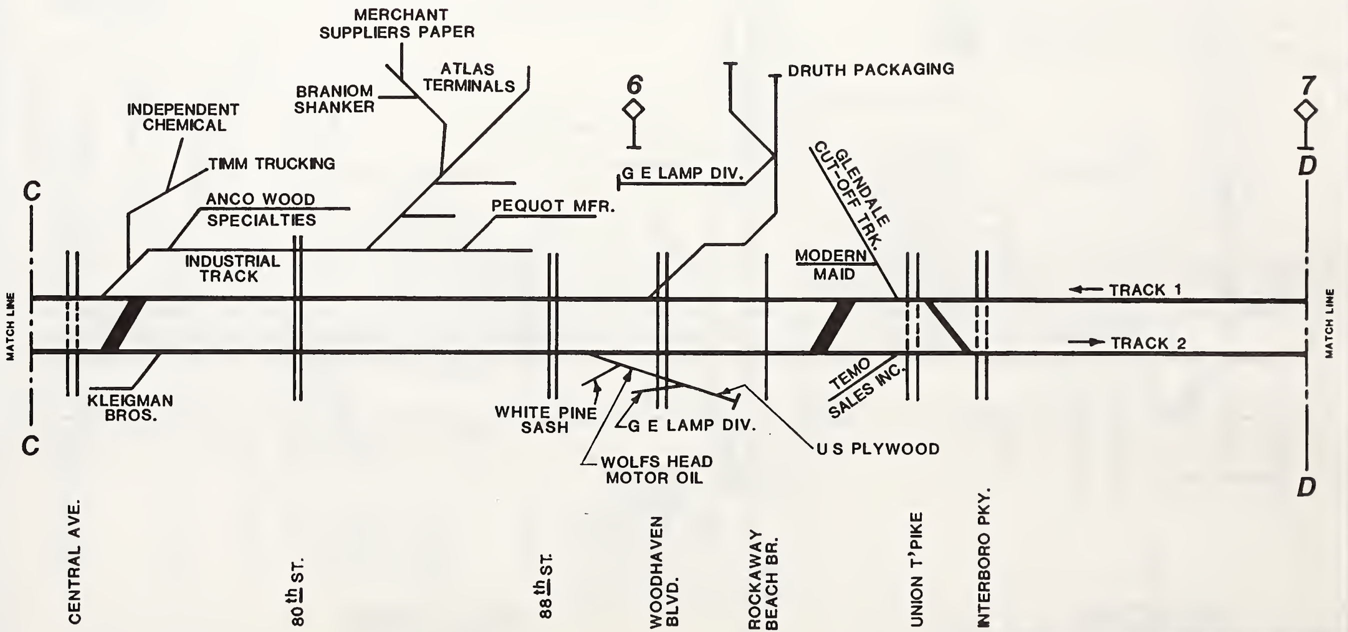
Montauk Branch- Track Schematic
Montauk Transfer Alternative
Track Modifications

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-2



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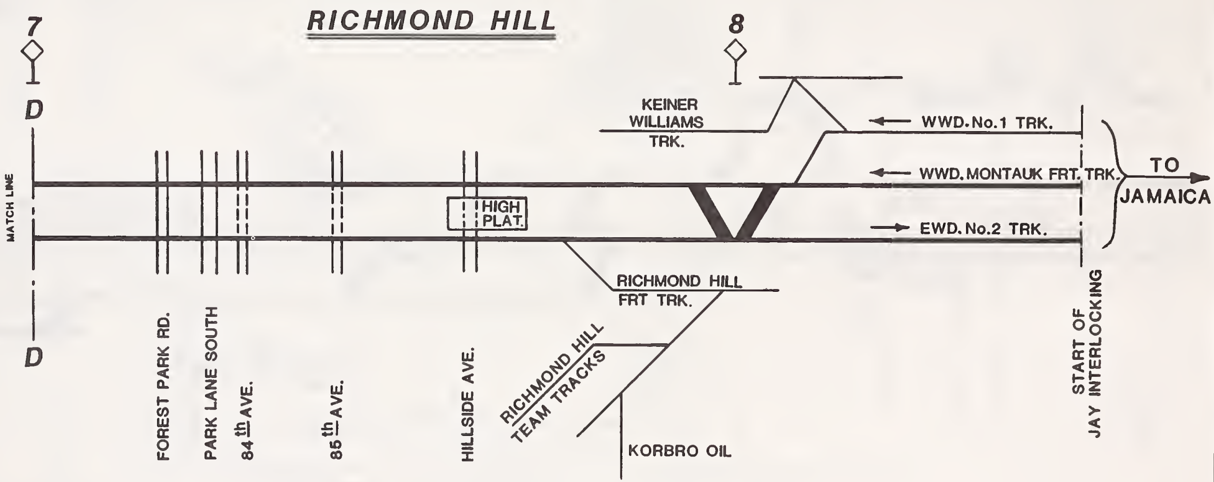
AKRF INC — BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch- Track Schematic
Montauk Transfer Alternative
Track Modifications

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-2



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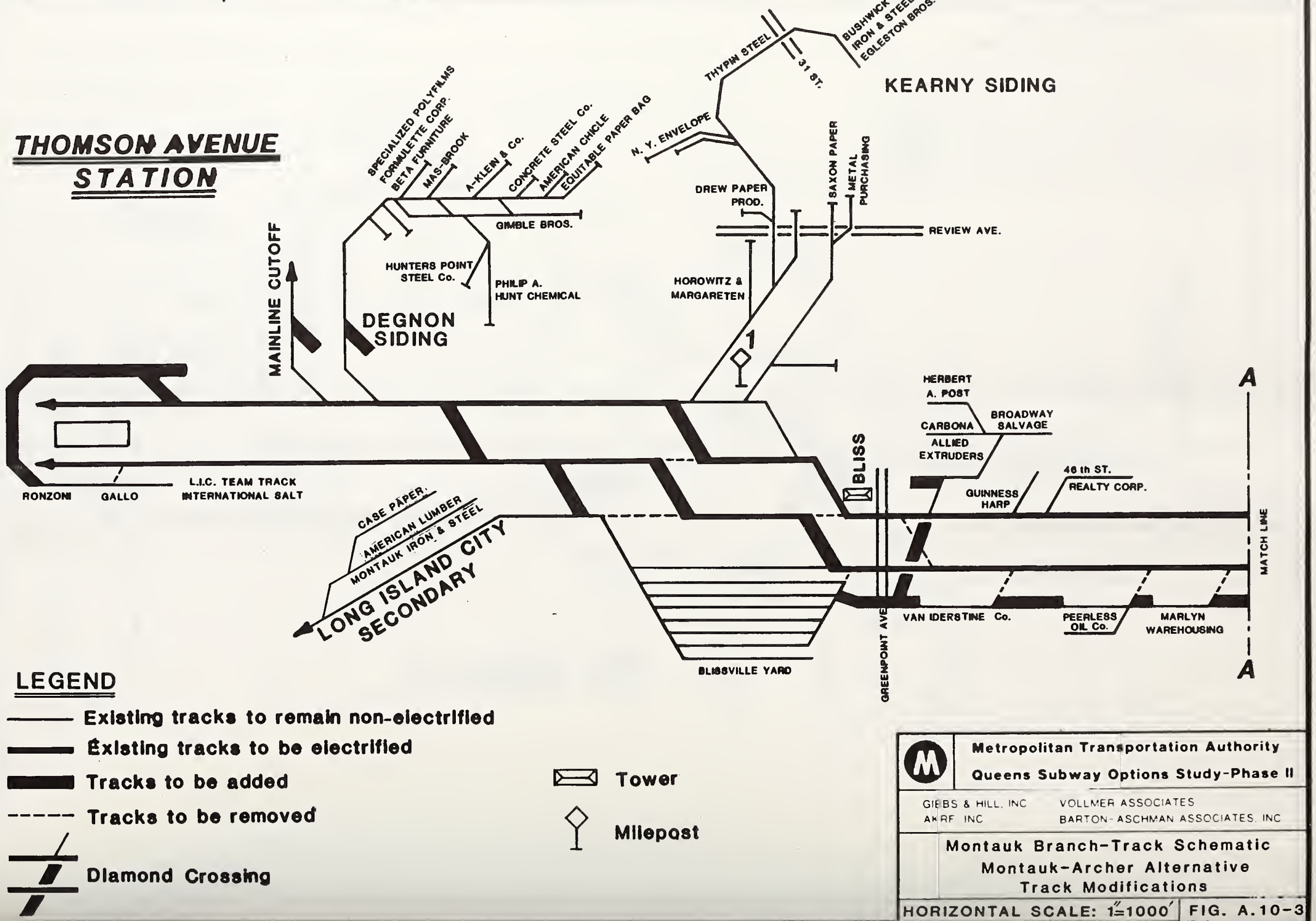
AKRF INC — BARTON-ASCHMAN ASSOCIATES, INC

Montauk Branch– Track Schematic
Montauk Transfer Alternative
Track Modifications

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-2



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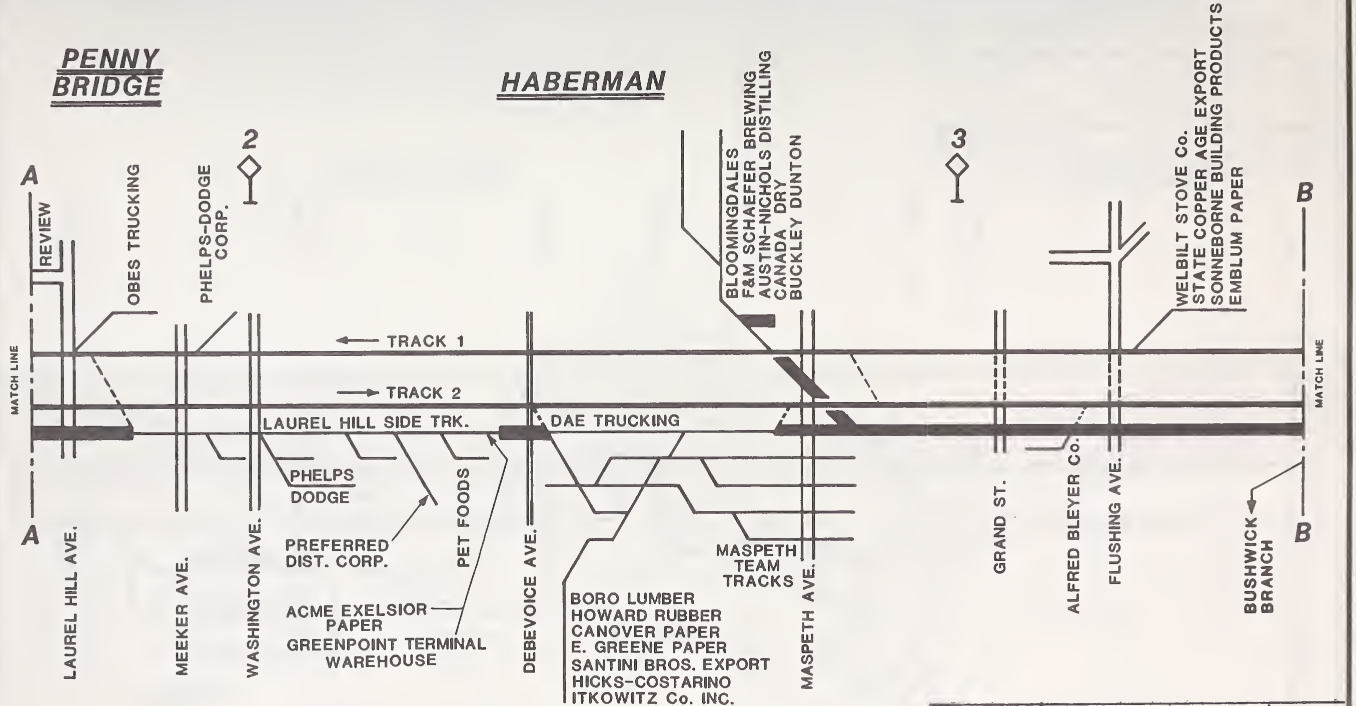
AKRF INC — BARTON-ASCHMAN ASSOCIATES, INC

Montauk Branch-Track Schematic
Montauk-Archer Alternative
Track Modifications

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-3



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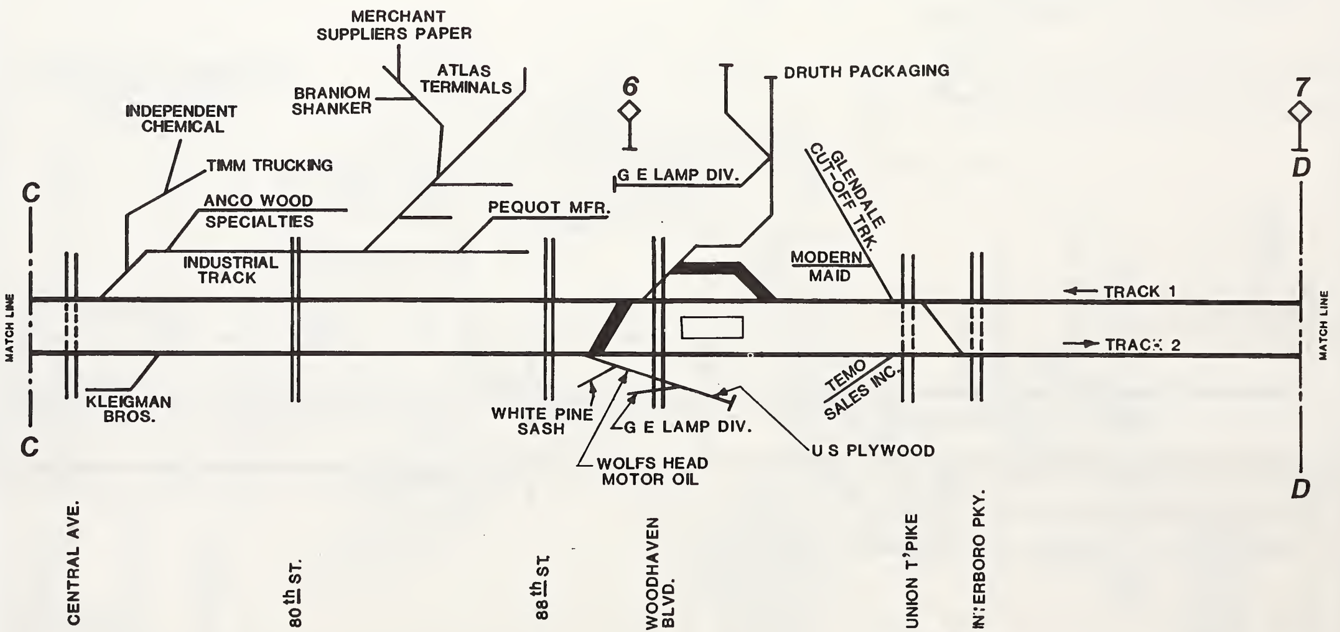
AKRF INC — BARTON-ASCHMAN ASSOCIATES INC

Montauk Branch-Track Schematic
Montauk-Archer Alternative
Track Modifications

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-3



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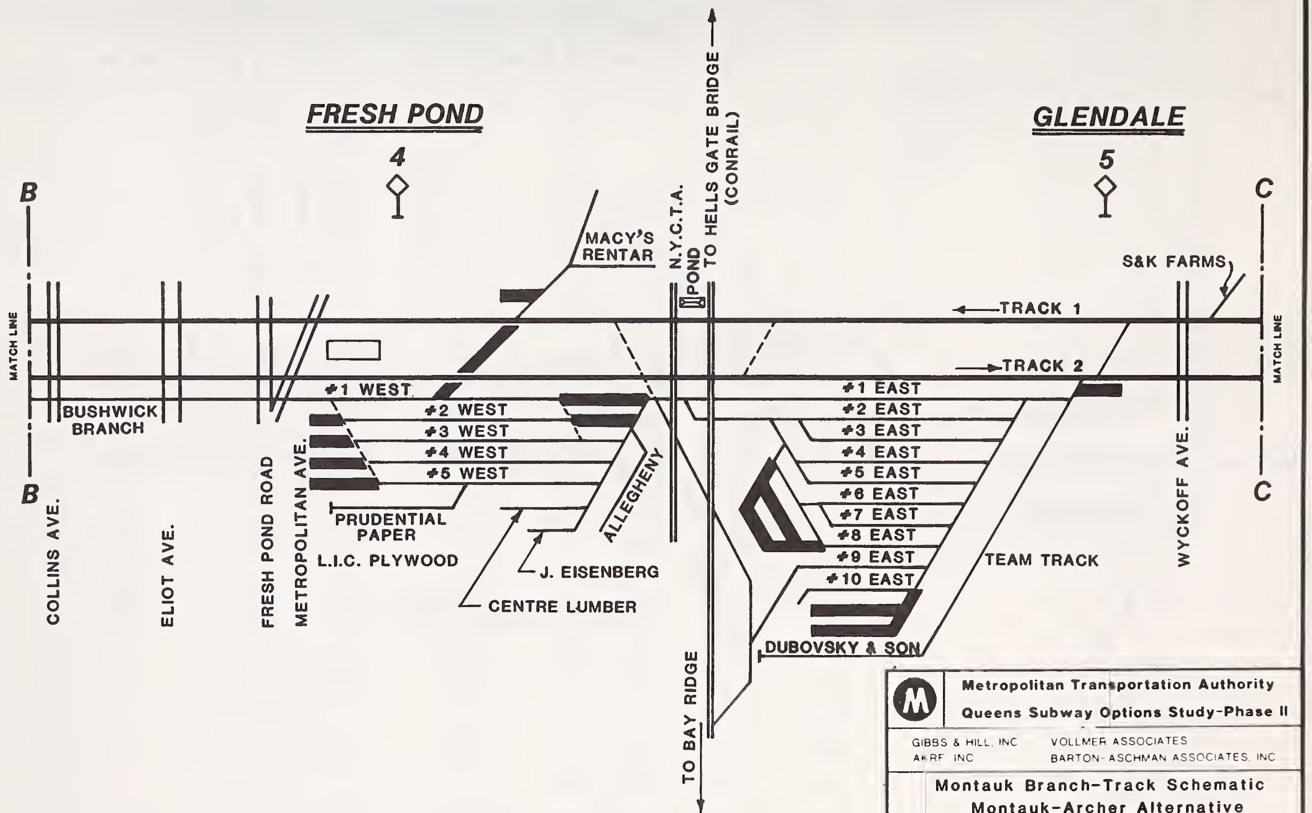
Queens Subway Options Study-Phase II

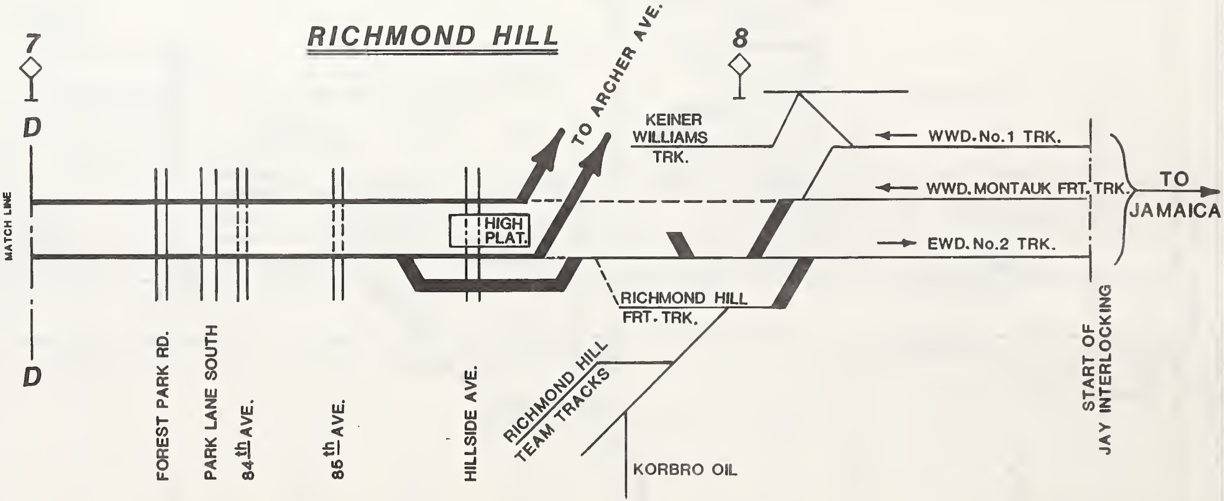
GIBBS & HILL, INC VOLLMER ASSOCIATES
AKRF INC BARTON-ASCHMAN ASSOCIATES, INC

Montauk Branch-Track Schematic
Montauk-Archer Alternative
Track Modifications

HORIZONTAL SCALE: 1"=1000' | FIG. A.10-3



Metropolitan Transportation Authority Queens Subway Options Study-Phase II	
GIBBS & HILL, INC AKRF INC	VOLLMER ASSOCIATES BARTON-ASCHMAN ASSOCIATES, INC
Montauk Branch-Track Schematic Montauk-Archer Alternative Track Modifications	
HORIZONTAL SCALE: 1"=1000'	FIG. A.10-3



NOTE:

THE RICHMOND HILL STATION BYPASS TRACK SHOWN IS A GAUNTLET CONSTRUCTED ON THE EXISTING ELEVATED STRUCTURE

Metropolitan Transportation Authority Queens Subway Options Study-Phase II	
GIBBS & HILL, INC AKRF INC	VOLLMER ASSOCIATES BARTON-ASCHMAN ASSOCIATES INC
Montauk Branch-Track Schematic Montauk-Archer Alternative Track Modifications	
HORIZONTAL SCALE: 1"=1000'	FIG. A.10-3

Appendix A.11 Cost Sensitivity/Inflation Factors

Chapter 6 presents the base case of operating income in which costs are projected to rise at 5.0 percent in accordance with MTA expectations for the bulk of the cost components, including labor and transportation materials. Energy costs are expected to rise at 7.0 percent per year. In this section the 7.0 percent cost inflation factor is treated as an upper sensitivity test. In addition, annual operating incomes (deficits) for:

1) Subway
2) LIRR
3) NYCTA bus
4) Private bus
5) Total study area items 1-4
6) Total MTA (NYCTA, SIRTOA, LIRR, Metro North, MSBA)

are presented for both the 5 percent and 7 percent cost inflation factors. In all cases revenue inflates at 5.4 percent per year in addition to a real growth of about 50 percent in fares from 1983 to 2002 for all modes.

Table A.11-1 is a summary of the cumulative operating incomes for each options for the 17 year period from 1986 to 2002 using the 7.0 cost inflation factor. In some instances, incomes are identical to those of Table 6-5. An example is the LIRR in the No Additional Construction, Local Connection and Queens Bypass alternatives. This is because the LIRR incurs no additional costs in these cases; its service pattern is unaffected by the study. In some instances, notably NYCTA bus, incomes actually increase. This is because the income results from a reduction in costs due to the discontinuance of the Q49 bus. The value of the cost avoidance is greater in this case because costs grow more rapidly.

Tables A.11-2, 3 and 4 present annual incomes/deficits for the subway, LIRR, NYCTA bus, private bus and the combination thereof in the study area with costs inflating at 5 percent per year. Table A.11-4 also contains a column showing the total subsidized operating deficit of the MTA including SIRTOA, Metro North and MSBA as well as NYCTA and the LIRR.

Tables A.11-5,6 and 7 present the same information as tables A.11-2, 3 and 4 but for a 7 percent cost inflation factor. In this case the incomes in the year 2000 range from +$4.15 million for No Additional Construction to -$86.58 million for the Montauk Transfer. This contrasts with the incomes of +$16.09 million in No Additional Construction and -$45.86 for the Montauk Transfer if costs increase at only 5 percent. In either case the cumulative deficit is less than 2 percent of the projected MTA deficit, which excludes the five alternatives. The MTA deficit as calculated allows for real growth in fares, revenues inflation at 5.4 percent per year and the cost inflation factor.

TABLE A.11-1

QUEENS SUBWAY OPTIONS STUDY--PHASE II

CUMULATIVE IMPACT ON OPERATING INCOME

MILLIONS OF CURRENT DOLLARS
COST INFLATION FACTOR=1.070
REVENUE INFLATION FACTOR=1.054

	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
NYCTA SUBWAY	-223.09	-397.88	-557.61	-494.06	-388.77
LIRR	19.87	17.42	-48.86	-195.22	-69.59
NYCTA BUS	87.09	92.15	97.93	-63.08	49.76
TOTAL MTA	-116.14	-288.31	-508.54	-752.36	-408.61
PRIVATE BUS	32.06	36.45	33.36	28.07	-1.10
TOTAL(MILLIONS)	-84.07	-251.86	-475.18	-724.30	-409.71
MTA INCOME(MIL)	-47031.34	-47031.34	-47031.34	-47031.34	-47031.34
RATIO ALTER/MTA	0.0018	0.0054	0.0101	0.0154	0.0087

NOTES :

POSITIVE NUMBERS DECREASE DEFICIT

NEGATIVE NUMBERS INCREASE DEFICIT

NEGATIVE RATIO ALTER/MTA = + INCOME FOR ALTERNATIVE

POSITIVE RATIO ALTER/MTA = - INCOME FOR ALTERNATIVE

TABLE A.11-2

QUEENS SUBWAY OPTIONS STUDY--PHASE II
ANNUAL SUBWAY OPERATING INCOME

MILLIONS OF CURRENT DOLLARS
COST INFLATION FACTOR=1.050
REVENUE INFLATION FACTOR=1.054

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	-14.47	-14.47	-14.47	-14.47	-14.47
1987	-14.04	-14.04	-14.04	-14.04	-14.04
1988	-13.55	-13.55	-13.55	-13.55	-13.55
1989	-13.04	-13.04	-13.04	-13.04	-13.04
1990	-12.36	-12.36	-12.36	-12.36	-12.36
1991	-11.64	-11.64	-11.64	-11.64	-11.64
1992	-10.68	-10.68	-10.68	-10.68	-10.68
1993	-9.69	-12.31	-9.69	-9.69	-9.69
1994	-8.39	-12.75	-8.39	-8.39	-8.39
1995	-7.08	-12.94	-7.08	-25.59	-7.08
1996	-5.39	-13.39	-5.39	-26.80	-5.39
1997	-3.69	-13.57	-3.69	-27.97	-15.99
1998	-1.52	-14.03	-40.40	-29.29	-16.56
1999	0.64	-14.17	-41.80	-30.56	-16.80
2000	3.38	-14.63	-43.61	-32.00	-17.39
2001	6.08	-14.73	-45.10	-33.38	-17.61
2002	9.49	-15.19	-47.04	-34.95	-18.20
TOTAL(MILLIONS)	-105.95	-227.48	-341.96	-348.38	-222.85

ANNUAL LIRR OPERATING INCOME

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	0.59	0.59	0.59	0.59	0.59
1987	0.65	0.65	0.65	0.65	0.65
1988	0.71	0.71	0.71	0.71	0.71
1989	0.77	0.77	0.77	0.77	0.77
1990	0.84	0.84	0.84	0.84	0.84
1991	0.92	0.92	0.92	0.92	0.92
1992	1.00	1.00	1.00	1.00	1.00
1993	1.07	0.89	1.07	1.07	1.07
1994	1.14	0.94	1.14	1.14	1.14
1995	1.21	1.01	1.21	-7.18	1.21
1996	1.29	1.07	1.29	-7.05	1.29
1997	1.37	1.14	1.37	-6.77	-10.56
1998	1.46	1.21	-10.63	-6.44	-11.21
1999	1.56	1.29	-11.32	-6.05	-11.90
2000	1.65	1.37	-12.05	-5.61	-12.64
2001	1.76	1.46	-12.80	-5.24	-13.39
2002	1.87	1.55	-13.63	-4.67	-14.21
TOTAL(MILLIONS)	19.87	17.42	-48.86	-41.32	-63.72

TABLE A.11-3

QUEENS SUBWAY OPTIONS STUDY--PHASE II
ANNUAL CITY BUS OPERATING INCOME

MILLIONS OF CURRENT DOLLARS
COST INFLATION FACTOR=1.050
REVENUE INFLATION FACTOR=1.054

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	1.77	1.77	1.77	1.77	1.77
1987	1.99	1.99	1.99	1.99	1.99
1988	2.23	2.23	2.23	2.23	2.23
1989	2.48	2.48	2.48	2.48	2.48
1990	2.77	2.77	2.77	2.77	2.77
1991	3.06	3.06	3.06	3.06	3.06
1992	3.40	3.40	3.40	3.40	3.40
1993	3.75	4.99	3.75	3.75	3.75
1994	4.15	5.26	4.15	4.15	3.47
1995	4.56	5.57	4.56	-8.47	2.43
1996	5.03	5.87	5.03	-8.93	2.79
1997	5.51	6.22	5.51	-9.48	2.69
1998	6.07	6.56	8.45	-9.99	2.85
1999	6.63	6.95	8.97	-10.61	3.05
2000	7.28	7.32	9.45	-11.19	3.22
2001	7.95	7.76	10.03	-11.87	3.44
2002	8.71	8.18	10.58	-12.52	3.64
TOTAL(MILLIONS)	77.33	82.40	88.17	-57.46	49.04

ANNUAL PRIVATE BUS OPERATING INCOME

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	0.15	0.15	0.15	0.15	0.15
1987	0.29	0.29	0.29	0.29	0.29
1988	0.43	0.43	0.43	0.43	0.43
1989	0.58	0.58	0.58	0.58	0.58
1990	0.76	0.76	0.76	0.76	0.76
1991	0.94	0.94	0.94	0.94	0.94
1992	1.16	1.16	1.16	1.16	1.16
1993	1.38	2.51	1.38	1.38	1.38
1994	1.64	2.65	1.64	1.64	1.64
1995	1.91	2.82	1.91	2.19	1.91
1996	2.23	2.98	2.23	2.32	2.23
1997	2.55	3.18	2.55	2.47	-1.16
1998	2.93	3.36	3.60	2.61	-1.22
1999	3.32	3.58	3.84	2.78	-1.27
2000	3.78	3.78	4.05	2.94	-1.33
2001	4.24	4.03	4.32	3.14	-1.39
2002	4.79	4.26	4.56	3.31	-1.45
TOTAL(MILLIONS)	33.09	37.47	34.38	29.09	3.65

TABLE A.11-4

QUEENS SUBWAY OPTIONS STUDY--PHASE II
ANNUAL STUDY AREA OPERATING INCOME

MILLIONS OF CURRENT DOLLARS
COST INFLATION FACTOR=1.050
REVENUE INFLATION FACTOR=1.054

	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)	TOTAL MTA (DOLLARS)
1986	-11.96	-11.96	-11.96	-11.96	-11.96	-1197.00
1987	-11.12	-11.12	-11.12	-11.12	-11.12	-1145.79
1988	-10.17	-10.17	-10.17	-10.17	-10.17	-1139.17
1989	-9.20	-9.20	-9.20	-9.20	-9.20	-1184.99
1990	-7.99	-7.99	-7.99	-7.99	-7.99	-1202.61
1991	-6.71	-6.71	-6.71	-6.71	-6.71	-1250.25
1992	-5.12	-5.12	-5.12	-5.12	-5.12	-1266.71
1993	-3.49	-3.92	-3.49	-3.49	-3.49	-1316.04
1994	-1.46	-3.90	-1.46	-1.46	-2.14	-1330.18
1995	0.60	-3.54	0.60	-39.04	-1.53	-1380.98
1996	3.16	-3.47	3.16	-40.46	0.92	-1392.90
1997	5.74	-3.02	5.74	-41.74	-25.02	-1444.93
1998	8.94	-2.90	-38.98	-43.11	-26.14	-1453.08
1999	12.15	-2.34	-40.31	-44.44	-26.93	-1505.98
2000	16.09	-2.15	-42.16	-45.86	-28.13	-1510.39
2001	20.02	-1.48	-43.55	-47.36	-28.94	-1563.77
2002	24.86	-1.20	-45.53	-48.83	-30.22	-1562.99
TOTAL(MILLIONS)	24.34	-90.19	-268.27	-418.07	-233.88	-22847.76

TABLE A.11-5

QUEENS SUBWAY OPTIONS STUDY--PHASE II
ANNUAL SUBWAY OPERATING INCOME

MILLIONS OF CURRENT DOLLARS
COST INFLATION FACTOR=1.070
REVENUE INFLATION FACTOR=1.054

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	-15.47	-15.47	-15.47	-15.47	-15.47
1987	-15.46	-15.46	-15.46	-15.46	-15.46
1988	-15.43	-15.43	-15.43	-15.43	-15.43
1989	-15.44	-15.44	-15.44	-15.44	-15.44
1990	-15.32	-15.32	-15.32	-15.32	-15.32
1991	-15.22	-15.22	-15.22	-15.22	-15.22
1992	-14.95	-14.95	-14.95	-14.95	-14.95
1993	-14.72	-20.04	-14.72	-14.72	-14.72
1994	-14.27	-21.76	-14.27	-14.27	-14.27
1995	-13.88	-23.37	-13.88	-34.57	-13.88
1996	-13.19	-25.37	-13.19	-37.11	-13.19
1997	-12.61	-27.25	-12.61	-39.75	-30.76
1998	-11.65	-29.57	-65.83	-42.67	-33.35
1999	-10.82	-31.75	-70.56	-45.70	-35.80
2000	-9.53	-34.43	-76.02	-49.06	-38.79
2001	-8.42	-36.97	-81.48	-52.54	-41.64
2002	-6.73	-40.09	-87.77	-56.40	-45.10
TOTAL(MILLIONS)	-223.09	-397.88	-557.61	-494.06	-388.77

ANNUAL LIRR OPERATING INCOME

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	0.59	0.59	0.59	0.59	0.59
1987	0.65	0.65	0.65	0.65	0.65
1988	0.71	0.71	0.71	0.71	0.71
1989	0.77	0.77	0.77	0.77	0.77
1990	0.84	0.84	0.84	0.84	0.84
1991	0.92	0.92	0.92	0.92	0.92
1992	1.00	1.00	1.00	1.00	1.00
1993	1.07	0.89	1.07	1.07	1.07
1994	1.14	0.94	1.14	1.14	1.14
1995	1.21	1.01	1.21	-18.97	1.21
1996	1.29	1.07	1.29	-20.59	1.29
1997	1.37	1.14	1.37	-22.23	-11.27
1998	1.46	1.21	-10.63	-24.01	-12.01
1999	1.56	1.29	-11.32	-25.93	-12.81
2000	1.65	1.37	-12.05	-28.00	-13.66
2001	1.76	1.46	-12.80	-30.38	-14.54
2002	1.87	1.55	-13.63	-32.81	-15.50
TOTAL(MILLIONS)	19.87	17.42	-48.86	-195.22	-69.59

TABLE A.11-6

QUEENS SUBWAY OPTIONS STUDY--PHASE II
ANNUAL CITY BUS OPERATING INCOME

MILLIONS OF CURRENT DOLLARS
COST INFLATION FACTOR=1.070
REVENUE INFLATION FACTOR=1.054

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	1.85	1.85	1.85	1.85	1.85
1987	2.11	2.11	2.11	2.11	2.11
1988	2.39	2.39	2.39	2.39	2.39
1989	2.68	2.68	2.68	2.68	2.68
1990	3.01	3.01	3.01	3.01	3.01
1991	3.36	3.36	3.36	3.36	3.36
1992	3.76	3.76	3.76	3.76	3.76
1993	4.17	5.41	4.17	4.17	4.17
1994	4.64	5.75	4.64	4.64	3.80
1995	5.13	6.14	5.13	-9.08	2.46
1996	5.68	6.52	5.68	-9.63	2.82
1997	6.25	6.97	6.25	-10.28	2.51
1998	6.91	7.40	9.29	-10.91	2.64
1999	7.59	7.90	9.92	-11.64	2.81
2000	8.36	8.40	10.53	-12.35	2.95
2001	9.15	8.97	11.24	-13.18	3.14
2002	10.06	9.53	11.93	-13.98	3.30
TOTAL(MILLIONS)	87.09	92.15	97.93	-63.08	49.76

ANNUAL PRIVATE BUS OPERATING INCOME

YEAR	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)
1986	0.14	0.14	0.14	0.14	0.14
1987	0.27	0.27	0.27	0.27	0.27
1988	0.42	0.42	0.42	0.42	0.42
1989	0.56	0.56	0.56	0.56	0.56
1990	0.73	0.73	0.73	0.73	0.73
1991	0.91	0.91	0.91	0.91	0.91
1992	1.12	1.12	1.12	1.12	1.12
1993	1.34	2.46	1.34	1.34	1.34
1994	1.59	2.60	1.59	1.59	1.59
1995	1.85	2.77	1.85	2.13	1.85
1996	2.16	2.91	2.16	2.25	2.16
1997	2.47	3.10	2.47	2.39	-1.69
1998	2.85	3.27	3.51	2.52	-1.82
1999	3.22	3.48	3.74	2.68	-1.95
2000	3.67	3.67	3.94	2.83	-2.09
2001	4.11	3.91	4.19	3.01	-2.24
2002	4.65	4.12	4.42	3.17	-2.41
TOTAL(MILLIONS)	32.06	36.45	33.36	28.07	-1.10

TABLE A.11-7

QUEENS SUBWAY OPTIONS STUDY--PHASE II
ANNUAL STUDY AREA OPERATING INCOME

MILLIONS OF CURRENT DOLLARS
COST INFLATION FACTOR=1.070
REVENUE INFLATION FACTOR=1.054

	NO ADDITIONAL CONSTRUCTION (DOLLARS)	LOCAL CONNECTION (DOLLARS)	QUEENS BYPASS (DOLLARS)	SUBWAY/LIRR TRANSFER (DOLLARS)	MONTAUK/ARCHER (DOLLARS)	TOTAL MTA (DOLLARS)
1986	-12.89	-12.89	-12.89	-12.89	-12.89	-1404.25
1987	-12.43	-12.43	-12.43	-12.43	-12.43	-1438.71
1988	-11.91	-11.91	-11.91	-11.91	-11.91	-1527.32
1989	-11.42	-11.42	-11.42	-11.42	-11.42	-1678.78
1990	-10.73	-10.73	-10.73	-10.73	-10.73	-1813.35
1991	-10.03	-10.03	-10.03	-10.03	-10.03	-1990.25
1992	-9.08	-9.08	-9.08	-9.08	-9.08	-2149.35
1993	-8.15	-11.27	-8.15	-8.15	-8.15	-2355.84
1994	-6.90	-12.47	-6.90	-6.90	-7.73	-2542.92
1995	-5.69	-13.46	-5.69	-60.48	-8.36	-2783.76
1996	-4.07	-14.87	-4.07	-65.09	-6.92	-3004.28
1997	-2.50	-16.04	-2.50	-69.87	-41.21	-3285.03
1998	-0.43	-17.68	-63.65	-75.06	-44.54	-3543.72
1999	1.55	-19.07	-68.22	-80.58	-47.75	-3870.78
2000	4.15	-20.99	-73.60	-86.58	-51.59	-4174.92
2001	6.61	-22.64	-78.85	-93.09	-55.27	-4555.73
2002	9.85	-24.89	-85.06	-100.02	-59.70	-4912.35
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TOTAL(MILLIONS)	-84.07	-251.86	-475.18	-724.30	-409.71	-47031.34

Appendix A.12 Fare Sensitivity Analysis

Of the five alternatives being considered for the Queens Subway Options Study, the Subway/LIRR-Montauk Transfer option is the only scheme which involves special fare assumptions. As described in Working Paper No. 2: Travel Forecast - Travel Demand Analysis, a sub-modal split model was applied at the census tract level assuming a fare of $2.20 for riders who can walk to the LIRR stations, and a fare of $2.80 for riders who used buses to gain access to the stations. These specific fares are used for the base case assumption because they are consistent with existing NYCTA and LIRR fare structures and joint marketing arrangements. However, it is recognized that fare assumptions can be a policy issue and that higher or lower fares might be charged for this service.

Fare-Level Assumptions and Ridership Sensitivity

In order to define the significance of fare levels in developing travel demand forecasts for the Subway/LIRR transfer service, the sub-modal split model was applied a number of times using a range of fare levels. The lowest fare tested assumed that riders of the LIRR transfer service would pay a 90 cent fare at the station with a free transfer at Thomson Avenue. Riders using buses for access to the LIRR stations would pay the same double fare as those utilizing feeder buses and the Jamaica subways. So in effect, walk trips to LIRR stations were given a 90 cent reduction over existing fare levels, while those using bus accesses would pay the same fare as most area residents pay now.

The highest fare tested assumed that no special joint fare marketing provisions would be made for the transfer service. Riders would pay a full fare at the Thomson Transfer Station, the appropriate LIRR fare (at the monthly rate) and a full fare for bus access to a LIRR station. For this case, the highest fare paid would be $3.70 for those requiring bus access to reach the LIRR stations and $2.80 for those who walk to the station. Table A.12-1 shows the resulting volumes for the five stations east of Jamaica for the fare levels tested.

For these five stations, east of Jamaica, at the lowest fare tested, year 2000 ridership is 10,744 peak hour trips. This section focuses on ridership east of Jamaica because this area contains the riders whose trip involves a shift from one mode to another. At the $2.20-$2.80 fare, the ridership drops to 7,056, and at the highest fare the ridership is 3,609. In the Montauk Transfer fare sensitivity analysis area, it is projected that there will be a total of 15,783 peak hour Manhattan bound trips in year 2000. So, even when fare is not an issue, as in the case of the lowest fare tested, the transfer service attracts 68 percent of the total market, with 32 percent of the market continuing to use feeder bus service to Jamaica.

Figure A.12-1 shows the market share of this total, by station, for the various fare levels. As can be seen from the graph, Atlantic Branch Stations attract a larger share of the market than Main Line Stations at every fare level. Furthermore, stations more distant from Jamaica attract a larger share than stations closer in.

Figure A. 12-1
Queens Subway Options Study, Montauk Transfer
Market Share Attracted By Fare Level

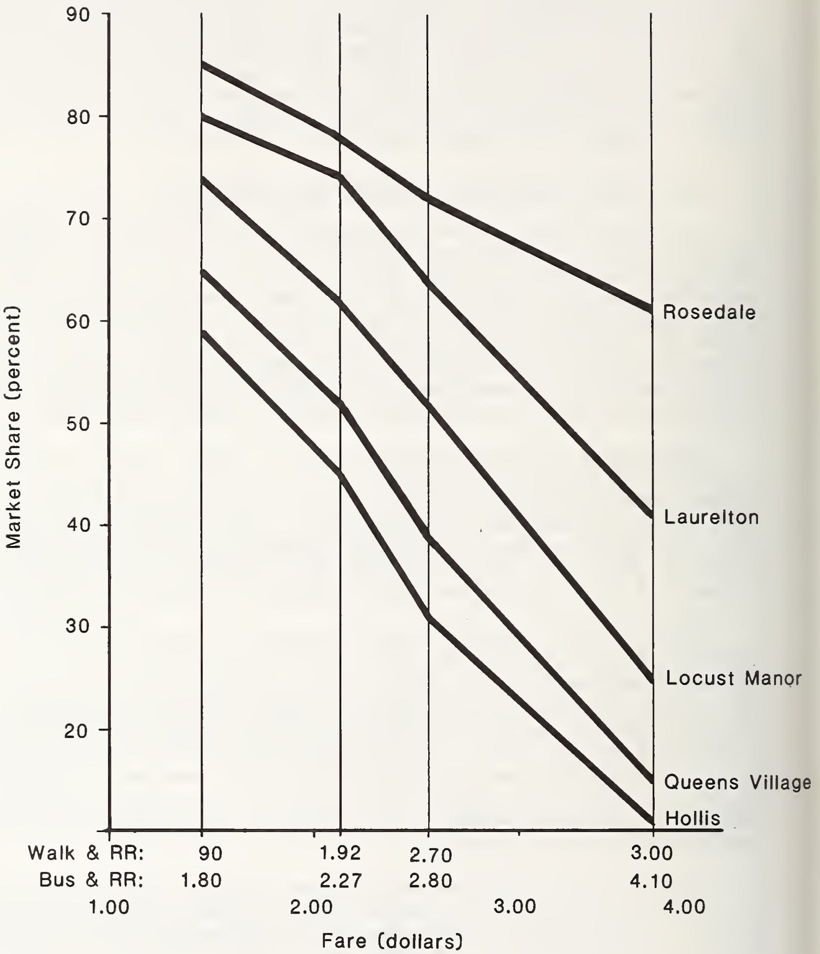


TABLE A.12-1

TRANSFER RIDERSHIP FOR THREE FARE LEVELS

Station	Mode	$0.90-1.80	$2.20-2.80	$2.80-3.70
Hollis	Walk	699	512	314
	Other	2,718	1,265	349
	Total	3,417	1,777	663
Queens Village	Walk	397	358	239
	Other	1,663	856	237
	Total	2,060	1,214	476
Main Line Total	Walk	1,096	870	553
	Other	4,381	2,121	586
	Total	5,477	2,991	1,139
Locust Manor	Walk	1,491	1,271	691
	Other	1,001	523	152
	Total	2,492	1,724	843
Laurelton	Walk	1,055	932	637
	Other	778	530	288
	Total	1,833	1,462	925
Rosedale	Walk	300	273	242
	Other	672	536	460
	Total	972	809	702
Atlantic Branch Total	Walk	2,846	2,476	1,570
	Other	2,451	1,589	900
	Total	5,297	4,065	2,470
Total East of Jamaica	Walk	3,942	3,346	2,123
	Other	6,832	3,710	1,486
	Total	10,774	7,056	3,609

While these general relationships are maintained at each fare level tested, there are variations in the rate of patronage decrease with increases in fares. The market share of Queens Village goes from 65 percent at the lowest fare to 39 percent for $2.20-$2.80 fare. The market share change at Hollis is similar, going from 59 percent to 31 percent of potential ridership. Rosedale, in contrast, is not so sensitive to fare. There, the market share is 85 percent at the lowest fare, but a still respectable 72 percent at the $2.20-$2.80 fare. As can be seen from the curves, Laurelton and Locust Manor fall between these extremes.

Two important factors explain these differences. Probably most significant is the nature of the station tributary areas. Potential riders who can walk to LIRR stations are much less sensitive to fare simply because they do not have to pay for bus access. Note from Table A.12-1 that Main Line walk trips decrease by only 20 percent as the fare goes from 90 cents to $2.20. However, riders using bus access decrease by 52 percent with a $1.00 fare increase. Unfortunately potential patronage within walking distance of the Main Line stations is limited.

Even under the lowest fare assumption, only 1,098 walk trips are attracted. In contrast, there are 2,846 potential walk trips for the Atlantic Branch stations, or 54 percent of the potential patronage. In general, bus access is much more important to the Main Line stations. Eighty percent of potential riders use bus access in the lowest fare case.

The reliance of the Main Line stations on bus access also relates to the other factor which explains greater fare sensitivity for these stations. The Main Line stations, particularly Hollis, are physically closer to the Jamaica subways. At the Hollis Station, riders using bus access only save nine to eleven minutes when using LIRR Montauk Transfer service rather than feeder bus to 179th Street. Not surprisingly, the sub-modal split model reflects the common sense reality that riders are less likely to pay more for a service that is not clearly superior.

A key reason for using the sub-modal split model and applying it at the tract level was to insure that the ability of eastern Queens residents to pay higher fares would be taken into account in the patronage estimation process. An interesting observation that emerged from the detailed evaluation was that income levels were less important than the two factors already described in establishing potential ridership. Table A.12-2 shows median family income distribution by station tributary areas. Perhaps most significantly,it can be seen that for every station except Locust Manor, more than half of the households in the station tributary area had incomes higher than $22,000 in 1980. The potential riders in the study area tended to be more affluent than the typical Queens household. (The median household income for Queens in 1980 was $20,506.) Locust Manor differed from the others because of the Rochdale Village housing development. The median income for the Rochdale Village tract was in the $18,000 to $21,900 range in 1980. However, while the lower income does tend to make these 1,006 potential riders less apt to use the LIRR transfer service, those trips are within walking distance of the Locust Manor Station. In application, the time and convenience savings result in a forecast of a 63 percent capture even at the $2.20 fare level. The net effect is to minimize the impact of fare for this somewhat lower income area.

The impact of fare on some of the other low income areas in the study area is also minimal but for the opposite reason. The lowest income tracts are in the vicinity of the Hollis Station. In this area, particularly to the West of Hollis, the trip to Jamaica via feeder bus is short so the travel time benefits of using the transfer service are minimal. Consequently even at the lowest fare level, diversion to LIRR transfer service is not great. Since few trips are attracted under this circumstance, the loss in ridership is small as fares increase.

Once these low income tracts are taken into account, it can be seen that there is suprisingly little variation in income levels among station tributary areas. As can be seen from Table A.12-2, all of the stations have a significant number of trips in the higher income ranges, which are less sensitive to fare increases.

TABLE A.12-2

MEDIAN FAMILY INCOME
LIRR TRANSFER STATIONS, TRIBUTARY AREA
(COMPLETED BY TRACT, INCOME ROUNDED TO THOUSANDS $)

		13.9 & Less	14.0-17.9	18.0-21.9	22.0-25.9	26.0 +	TOTAL
Hollis	- Trips:	165	617	1,459	2,255	1,315	5,811
	Share:	2.8%	10.6%	25.1%	38.8%	22.6%	100%
Queens	- Trips:	-	60	615	1,574	928	3,177
Village	- Share:	-	1.9%	19.4%	49.5%	29.2%	100%
Locust	- Trips:	-	276	1,777	707	609	3,369
Manor	Share:	-	8.2%	52.7%	21.0%	18.1%	100%
Laurelton	- Trips:	-	96	491	613	1,080	2,280
	Share:	-	4.2%	21.5%	26.9%	47.4%	100%
Rosedale	- Trips:	-	-	184	883	79	1,146
	Share:	-	-	16.1%	77.1%	6.9%	100%
Total	- Trips:	165	1,049	4,526	6,032	4,011	15,783
	Share:	1.0%	6.6%	28.7%	38.2%	25.4%	100%

Median Family Income:	CD 11	- $26,332
	CD 12	- $17,295
	CD 13	- $23,950
	Queens Co.	- $20,506

In order to test the system impacts of ridership at the various fare levels, UTPS network assignment runs were made for the lowest and highest fare levels. The results of the UTPS analysis are shown on Table A.12-3. Volumes on the connecting subway service at the 63rd Street crossing range from a high of 13,500 at the lowest fare to a low of 7,200 when the highest fare is tested. The maximum diversion from the 53rd Street crossing (E & F service) is 7,800 trips for the lowest fare tested.

The network analysis points up several impacts of fares on system performance which diverges somewhat from common wisdom. First, note that lower fares divert trips from the 60th Street crossing and J service, as well as from the E and F. While southeastern Queens transit riders are most likely to use the E and F services, some riders will use the N for eastside access and a smaller share will continue to use the J service to reach downtown locations. In this context, it is not surprising that diversion occurs from these lines.

TABLE A.12-3

TRAVEL FORECASTS AT RIVER CROSSINGS - FARE SENSITIVITY
(Thousands)

	No Additional Construction	LIRR Montauk Transfer Service $0.90-1.80	LIRR Montauk Transfer Service $2.20-2.80	LIRR Montauk Transfer Service $2.80-3.70
NYCTA				
Queens				
63rd Street	0.2	13.5	10.4	7.2
60th Street	20.2	18.2	18.9	19.5
Astoria	21.4	21.1	21.1	21.1
Subtotal	41.6	39.3	40.0	40.6
53rd Street	58.9	51.1	53.6	56.0
Steinway	36.0	36.3	36.1	36.2
Total	136.7	140.2	140.1	140.0
Passenger/Car at 53rd St. Tunnel	245	213	223	233
North Brooklyn				
14th Street	11.5	11.5	11.5	11.5
Williamsburg	18.1	17.1	17.6	18.0
Total	29.6	28.6	29.1	29.5
Total NYCTA	166.3	168.8	169.2	169.5
LIRR				
Penn Station	49.5	47.1	46.7	46.7
Huntcrspoint	2.0	2.6	2.4	2.4
Flatbush	7.2	7.5	7.3	7.1
Long Island City	0.2	-	-	-
Thomson	-	13.0	9.9	6.7
Total LIRR	58.9	70.2	66.3	62.9

The other system impact is somewhat more complex. One of the service assumptions for the LIRR-Subway Transfer scheme is that LIRR Transfer service will replace LIRR Penn Station service. Therefore, it is not unexpected that some trips would be diverted from Penn Station. However, while some trips are diverted from Penn Station to the subway, other trips are diverted from the subway to Penn Station and Flatbush Avenue.

Particularly in the low fare case, the more frequent transfer service and the relatively convenient transfer at the LIRR Jamaica Station makes this an attractive service for trips with destinations near Penn Station. And, apparently some trips bound for downtown Manhattan find service via Flatbush better than the J service. It would appear that trips which require a transfer at Penn Station to another subway line are diverted away from regular LIRR services, while some other trips are attracted to LIRR regular service from subway service. These counteracting shifts tend to reduce the diversion from the E and F at the East River Crossing.

In summary, the fare sensitivity analysis shows that there is a limit to the potential use of the Transfer Scheme, and only a portion of the riders using the 63rd Street Tunnel will be diverted from the E and F service. On the other hand, the very low ridership at the highest fare level indicates that some special marketing efforts shoud be included if the Transfer service is to be implemented.

Operating Plan

Costs for the Montauk Transfer alternative presented in Chapter Two, Alternatives Considered, are predicted on an operating plan which has ten eight-car trains in the peak hour. There are five trains each from Queens Village and Rosedale plus returns. These trains carry 9,900 riders in the peak hour at the \$2.20/\$2.80 fare level.

If the fare is at the \$2.80/\$3.70 level, ridership drops to 6,700 riders in the peak hour. This would be accommodated by cutting consists to six-car trains. At the \$0.90/\$1.80 fare level, ridership climbs to 13,900 in the peak hour. The base case load factor is 1.03 (4 standees per car). This would rise to 1.45 (54 standees per car) unless additional service is provided. The Queens-oriented service is designed to provide seats for all passengers, consistent with LIRR service standards.

There is, however, no spare capacity to turn additional trains in the morning peak hour and very little in the evening peak hour. The Queens Village terminal has only one platform track for regular use by QOS trains. There are two tracks where the Atlantic Branch trains turn at Valley Stream, but other LIRR trains run through on both tracks. Trains are limited to eight cars by design constraints at the Queens Village Station. In addition, Hollis and Richmond Hill are designed for six-car trains, even the eight-car trains stopping there will overhang the platform. Atlantic Branch stations are eight cars long. Thus it is not feasible to increase train lengths beyond eight cars.

Two additional trips in each peak period can however be accommodated. In the morning, a train will leave the Queens Village Station at 7:40 AM, just before the peak begins, and make stops at Hollis, Jamaica (unlike other Main Line QOS trains), Richmond Hill and Thomson Avenue. The train will return to Jamaica where it will begin a second trip to Thomson Avenue. This second trip will satisfy the large demand for service at Jamaica and Richmond Hill, where all riders should get seats. In the evening, an additional train will leave Thomson Avenue at about 4:35 PM for Queens Village, making regular stops. The train will return to Thomson Avenue where it will make a second trip to Queens Village, arriving at about 6:10 PM. These additional trips depend on the ability of QOS trains to use Hillside Yard Secondary Track 5 for westbound movements during the peak hour. Only Main Line Track 3 carries westbound trains at present and QOS trains cannot reach it without impeding all LIRR Main Line trains. The secondary will be used by operating a small 4,000 foot track section between Hollis and Queens Village in both directions.

Table A.12-4 summarizes the operating plan for the three fare levels.

TABLE A.12-4

PEAK HOUR OPERATING SUMMARY

	Low Fare	Base Fare	High Fare
Fare Level	$0.90/1.80	$2.20/2.80	$2.80/3.70
Riders/Hour	13,900	9,900	6,700
Base Plan			
Trains/Hour	10	10	10
Cars/Train	8	8	8
Load Factor (120 seats/car)	1.45	1.03	0.70
Revised Plan			
Trains/Hour	12		10
Cars/Train	8		6
Load Factor	1.21 (25 standees)		0.93

Operating Cost Summary

Increasing the number of peak hour trips to 12 for the $0.90-$1.80 fare level requires the purchase of a twelfth trainset for revenue service. This is the major component in increased operating costs. The maintenance for these cars is over $800,000 per year.

Cutting back the consists from eight to six cars will reduce fleet size by 25 percent and will reduce onboard personnel. The following table is a summary of the cost increments:

TABLE A.12-5

OPERATING COST CHANGES
(millions)

Fare:	Cost Increase ($0.90-1.80)	Base Cost ($2.20-2.80)	Cost Decrease ($2.80-3.70)
MOE	$0.8	$ 9.3	$2.3
Transportation	0.3	11.4	1.6
Energy	0.0	0.8	0.1
G & A	0.2	4.3	0.6
	$1.3 increase	$25.8	$4.6 decrease

Revenues

Three fare scenarios are considered in this analysis for the Montauk Transfer. The base case fare level for this analysis is the one used for the travel demand model. The technique used here is to "pivot" from the results of the more extensive analysis used for the base case to obtain reasonable estimates of ridership and revenue estimates for additional fare scenarios.

Each scenario consists of several components of fare. There is the line-haul or Montauk portion of the fare, a transfer fare, and varying feeder bus fares. For the base case, the fare assumes that single tickets may be purchased for a complete one-way trip, including transfer at Thomson Avenue Station, at a price per trip the same as that which is currently available through the LIRR monthly pass. This reduces to a fare of $1.91 for most passengers, assuming 44 trips per monthly pass, purchased in zone one for $84.00. An additional $0.29 is credited to NYCTA for a fare of $2.20 for riders who walk to trains.

Analysis of the upper and lower test fare scenarios is predicated on the results of modeling the base case. Estimates of Montauk Transfer ridership were obtained for the sensitivity cases from network assignments and compared to the base case estimated ridership.

Because the travel market has been assumed to be essentially constant, changes in the Montauk Transfer ridership were assumed to result in an equal but opposite change in subway ridership. Long Island Rail Road service is only minimally affected by changes in the Montauk Transfer fare since there is no real overlap of service areas and since the Montauk Transfer enjoys at least a slight advantage in each scenario with respect to fare. Therefore, LIRR was not considered in this analysis.

Feeder bus revenue, however, varies with each alternative due to different station access patterns for the subway and the Montauk Transfer, and also due to the reduced feeder bus fare of the base case fare scenario.

The first step in estimating ridership and revenue was to compare the Montauk Transfer ridership for the sensitivity cases to the base case. The increases were subtracted from base case subway ridership whereas decreases were added. Riderships were multiplied by the correct fares to get new subway and Montauk Transfer revenues.

Surface transit ridership was obtained from the network assignment, and each component of ridership and revenue diversion was identified. The ridership diversion for the sensitivity cases was assumed to change in proportion to the change in Montauk Transfer ridership. Some feeder bus trips were more sensitive to changes in subway service than to changes in Montauk Transfer service. These feeder bus trips remained unaffected by the different fare scenarios.

Results of the multiple analysis are presented in Table A.12-6, from which several key observations can be made. A reduction in fare to the level of regular subway service including a full fare transfer at Thomson Station, can be expected to attract 32 percent more riders but lose nearly 46 percent of the base revenue of QOS trains. Subway transit ridership and revenue drop below 1983

TABLE A12-6
MONTAUK TRANSFER FARE SENSITIVITY ANALYSIS

	Low Fare Test (0.90/1.80)		Base Fare (2.20/2.80)		High Fare Test (2.80/3.70)	
Annual (000)	Annual Ridership	Revenue Change from Base	Annual Ridership	Incremental Revenue of Alternative	Annual Ridership	Revenue Change from Base
Montauk						
Line-Haul	17918	(13077)	13606	34461	9180	(11210)
Transfer at Thompson		(4802)		4802		5253
		(17879)		39263		(5957)
Subway (1)	287588	(4719)	291900	559	296326	4843
LIRR		0		-12542		0
Surface						
NYCTA	53743	(404)	55157	-3319	56609	2003
Private	71024	+ 36	71086	1324	71150	154
	124767	(368)	126243	-1995	127758	2157
Net Revenue Impact		(22966)				1043
Base Revenue		25285		25285		25285
Incremental Revenue		2319				26328

(1) Does not include Montauk Transfer passengers.

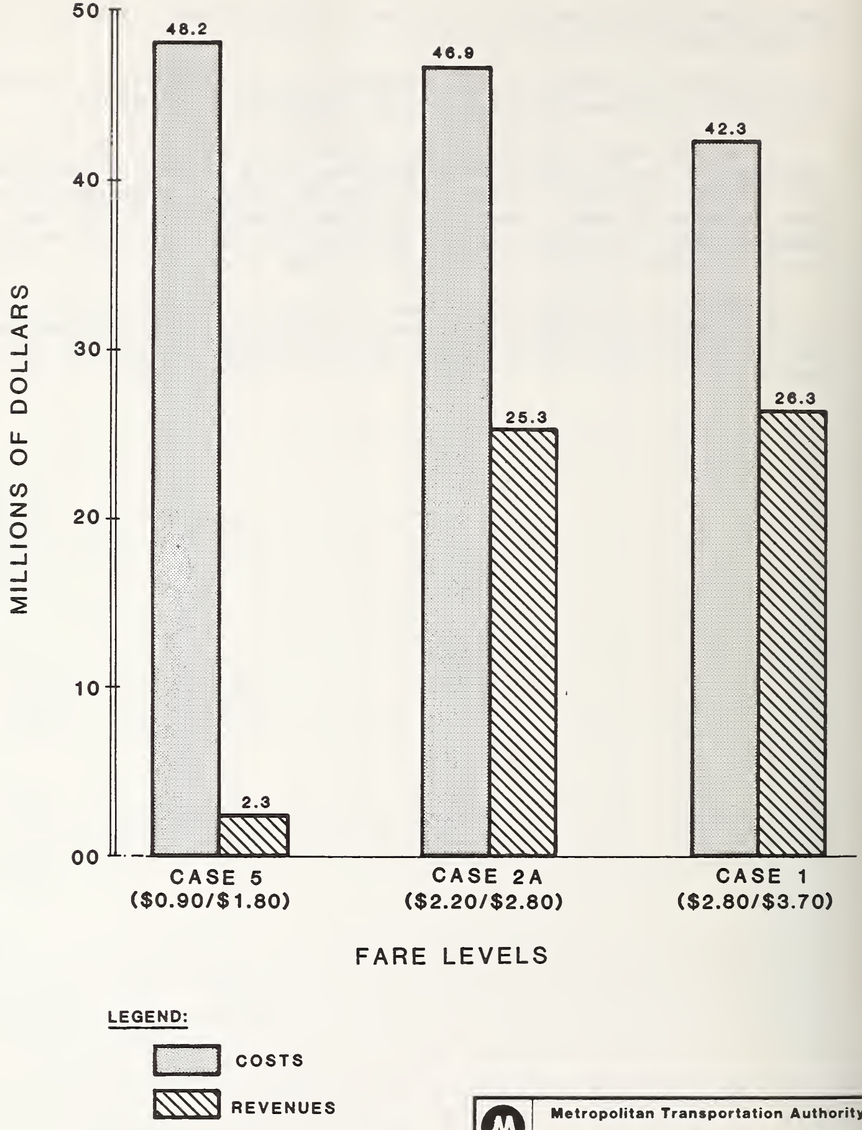
Total ridership is not shown because total ridership varies only due to diversion from feeder bus access and is not the focus of this analysis.

levels after allowing for real fare growth. Surface transit ridership declines by approximately 1.2 percent.

Incremental revenues of the transfer drop by 55 percent. Incremental revenue for the alternative would drop by $22,966,000 to $2,319,000.

It is estimated that an increase in the Montauk Transfer fare to a level comparable to current LIRR service (hightest) would decrease Montauk Transfer ridership by 33 percent, but revenue would fall by only 15 percent due to the large increase in fare. Increase in subway ridership by 1.5 percent would compensate for the revenue lost so that combined Montauk, subway and surface transit revenues represent a 4.1 percent increase in revenue.

Figure A.12-2 displays the incremental cost and revenues associated with the fare levels. The annual incremental deficit associated with the low fare test is $45.9 million, which is much greater than for the base and high fare cases.



Metropolitan Transportation Authority
Queens Subway Options Study-Phase II

GIBBS & HILL, INC. VOLLMER ASSOCIATES
AKRF, INC BARTON-ASCHMAN ASSOCIATES, INC.

Montauk Transfer Fare Sensitivity
Incremental Costs And Revenues-Year 2000

Figure A. 12-2