

**Southern Brooklyn Transportation Investment Study
Kings County, New York
P.I.N. X804.00; D007406**

Summary Report



October 2006

Submitted to:
New York Metropolitan Transportation Council

Submitted by:
Parsons Brinckerhoff Quade & Douglas, Inc.

In association with:
Cambridge Systematics, Inc.
SIMCO Engineering, P.C.
Urbitran Associates, Inc.
Zetlin Strategic Communications

Table of Contents

| | |
|---|-------------|
| EXECUTIVE SUMMARY | ES-1 |
| INTRODUCTION | 1 |
| STUDY GOALS AND OBJECTIVES..... | 3 |
| PUBLIC INPUT | 3 |
| GOALS & OBJECTIVES | 5 |
| EXISTING CONDITIONS..... | 7 |
| SOCIOECONOMIC CONDITIONS | 7 |
| ENVIRONMENTAL CONDITIONS | 8 |
| TRANSIT SYSTEM USAGE AND OPERATION | 8 |
| GOODS MOVEMENT | 9 |
| ACCIDENTS AND SAFETY | 11 |
| PEDESTRIAN AND BICYCLE TRANSPORTATION | 11 |
| SCENARIO DEVELOPMENT | 13 |
| IDENTIFICATION OF ALTERNATIVE IMPROVEMENTS | 13 |
| JOINT TAC/CLC SUBCOMMITTEES | 13 |
| TRANSPORTATION SCENARIO DEVELOPMENT..... | 13 |
| CONSENSUS LIST OF IMPROVEMENTS | 16 |
| EVALUATION OF SCENARIOS | 25 |
| EVALUATION OF SCENARIOS AND RESULTS | 26 |
| <i>2025 Baseline Compared to 2002 Base Year.....</i> | <i>26</i> |
| <i>Alternative Land Use Scenario Compared to 2025 Baseline.....</i> | <i>26</i> |
| <i>Bus Priority Measures</i> | <i>26</i> |
| <i>Passenger Ferry Service.....</i> | <i>27</i> |
| <i>Grade Separation Scenario (Flatbush Avenue and Avenue U).....</i> | <i>27</i> |
| <i>JFKIA Truck Freight Ferry</i> | <i>27</i> |
| <i>Transit Recommendations.....</i> | <i>28</i> |
| <i>Bike and Pedestrian Recommendations.....</i> | <i>28</i> |
| SCENARIO VIABILITY..... | 28 |
| PEDESTRIAN AND BICYCLE ISSUES..... | 29 |
| BICYCLE AND PEDESTRIAN IMPROVEMENTS | 29 |
| <i>Pedestrian Access to Transit.....</i> | <i>29</i> |
| <i>Safety and Mobility for Pedestrians and Bicyclists On Major Arterials.....</i> | <i>29</i> |
| <i>Safety Issues Relating to Speeding and Through Traffic on Neighborhood Streets.....</i> | <i>31</i> |
| <i>Truck Impacts on Residents Living on and off of Truck Routes.....</i> | <i>31</i> |
| <i>Bicycle Parking at Transit.....</i> | <i>31</i> |
| <i>Bicycle and Pedestrian Access to Shore Parkway Path and Other Recreational Facilities.....</i> | <i>32</i> |
| <i>East-West Connections for Cyclists</i> | <i>32</i> |
| <i>Gaps in the Pedestrian and Bicycle Network.....</i> | <i>32</i> |

List of Tables

| | | |
|-------------|--|----|
| TABLE ES-1: | SBTIS VIABILITY MATRIX - MEDIUM AND LONG TERM TRANSPORTATION IMPROVEMENTS..... | 5 |
| TABLE 1: | SBTIS SCENARIO MATRIX - MEDIUM AND LONG TERM TRANSPORTATION IMPROVEMENTS..... | 25 |
| TABLE 2: | SBTIS VIABILITY MATRIX - MEDIUM AND LONG TERM TRANSPORTATION IMPROVEMENTS..... | 28 |

List of Figures

| | | |
|-----------|--|----|
| FIGURE 1: | STUDY AREA | 1 |
| FIGURE 2: | BUS PRIORITY CORRIDORS..... | 17 |
| FIGURE 3: | PASSENGER FERRY SERVICE | 18 |
| FIGURE 4: | ROADWAY GRADE SEPARATION - FLATBUSH AVENUE AND AVENUE U..... | 19 |
| FIGURE 5: | HYPOTHETICAL JFKIA FREIGHT FERRY SERVICE CORRIDORS | 20 |
| FIGURE 6: | POTENTIAL SUBWAY IMPROVEMENTS | 21 |
| FIGURE 7: | POTENTIAL SUBWAY CONSTRUCTION..... | 22 |
| FIGURE 8: | BUS RAPID TRANSIT CORRIDORS | 23 |
| FIGURE 9: | BICYCLE & PEDESTRIAN RECOMMENDATIONS | 30 |

Executive Summary

The Southern Brooklyn Transportation Investment Study (SBTIS) is an area-wide, multimodal transportation planning study that was undertaken for the New York Metropolitan Transportation Council (NYMTC) to address transportation issues in the southern half of the Borough of Brooklyn, New York City. The purpose of the study was to assess current and future travel conditions and deficiencies and develop multimodal transportation improvement alternatives that address the movement of people and goods within and through the study area.

The SBTIS Summary Report highlights the activities performed for the study tasks – including development of study goals and objectives, assessment of current and future travel conditions and deficiencies, scenario development and evaluation of scenarios. All of the study tasks were informed through the extensive community involvement program.

COMMUNITY INVOLVEMENT PROGRAM

The SBTIS featured a proactive public and community involvement program. Community involvement efforts included visioning sessions with the general public, transportation agencies, local and elected officials, business organizations and other stakeholders. Input obtained at the sessions, along with comments received at resident and business focus groups and through the SBTIS website, e-mails and letters, have helped to define the study area's transportation problems and to obtain suggestions for short, medium and long-term improvements.

The Study's Technical Advisory Committee (TAC) and Community Liaison Committee (CLC) provide agency and public input to the SBTIS. Four subcommittees were formed from the memberships of the TAC and CLC to process the public input and organize the improvement suggestions to assist in the development of multimodal scenarios. The four Joint TAC/CLC Subcommittees are Goods Movement, Transit, Local Circulation/ Parking/ Bicycle & Pedestrian, and Travel Management.

SCENARIO DEVELOPMENT

Scenario development began with obtaining suggestions for transportation improvements from the community. The TAC, CLC and subcommittees used the public and agency suggestions to develop a consensus list of potential improvement scenarios for evaluation.

The scenarios encompassing all modes of travel (bus and rail transit, auto, truck, walk, bike and ferry) to address the existing and future transportation deficiencies of the study area. However, most of the transportation scenarios relate to transit improvements, including implementation of bus priority measures, improvements to the subway system, initiation of passenger ferry services and establishment of a regional bus terminal. There are also scenarios that relate to roadway and freight improvements. Additionally, an

Alternative Land Use scenario was developed for testing the transportation scenarios with a greater amount of development in and around the Downtown Brooklyn area than included in the 2025 future baseline scenario.

The transportation scenarios are:

- Bus Priority Measures – priority measures to improve existing bus service along four corridors
- Passenger Ferry Service – express and local service with five new landings to access Downtown Brooklyn and Manhattan
- Grade Separation at Flatbush Avenue and Avenue U – roadway grade separation for Flatbush Avenue through traffic to avoid the congested intersection
- JFKIA Truck Freight Ferry – freight ferry service to the Bronx, Manhattan, northern New Jersey and Connecticut
- Subway Improvements – improved service, service extensions, pedestrian connections and subway construction
- Downtown Brooklyn Regional Bus Terminal – terminal for regional and, possibly, intercity routes
- Bus Rapid Transit (BRT) – BRT services along six corridors, including the four corridors proposed for bus priority measures
- Non-motorized Modes – recommendations covering bicycling and walking modes of travel

EVALUATION OF SCENARIOS AND RESULTS

The consensus list of multimodal improvements was evaluated on the basis of how well they meet study goals and objectives. The goals, objectives and performance measures were developed early in the study to reflect an area-wide approach. Many of the transit improvement suggestions reflect this areawide approach. These suggestions, such as expansion of subway service, new bus rapid transit services and implementation of bus priority measures would be expected to meet study goals to make more efficient use of the region's transportation systems, expand or extend existing transit systems to promote more efficient movement of people, improve existing transportation systems to encourage more efficient movement of people, manage system-wide congestion and improve quality of life.

Testing and evaluation of the transit suggestions, except for bus priority measures and passenger ferry services, were not performed in this study. Transit improvement suggestions were forwarded to the MTA and NYCT for further consideration.

Roadway improvement suggestions received from the public covered all of the major arterials and numerous intersections throughout Southern Brooklyn. However, most of the suggestions were for short term improvements and increased enforcement of traffic

and parking regulations. The suggestions would be expected to meet the goals and objectives relating to transportation system efficiency, management of congestion and quality of life (safety) issues.

The improvement scenarios that were tested in this study include Bus Priority Measures, Passenger Ferry Service, Grade Separation at Flatbush Avenue and Avenue U, and JFKIA Truck Freight Ferry. The first three scenarios were tested using NYMTC's Best Practice Model (BPM), while the JFKIA Truck Freight Ferry scenario was tested using another method. The BPM also was used to compare the future 2025 Baseline to the 2002 Base Year and to compare the Alternative Land Use Scenario to the 2025 Baseline Scenario.

2025 Baseline Compared to 2002 Base Year

Most measures, such as Vehicle Miles of Travel (VMT) and Vehicle Hours of Travel (VHT) increased in both Brooklyn and the SBTIS study area, with truck traffic showing greater percentage increases compared to all vehicular traffic. For example, AM peak period truck VMT within the study area increased by 24%, compared to an increase of 7.5% for total vehicular traffic.

Alternative Land Use Scenario Compared to 2025 Baseline

The results for the Alternative Land Use Scenario were similar to the 2025 Baseline with only very slight decreases in total vehicle trips, VMT and VHT, and a slight increase in the transit share of total person trips. The slight decreases in vehicular travel and increase in transit share under the Alternative Land Use Scenario are a result of additional concentrations of activities and development in and around the Downtown Brooklyn area.

Bus Priority Measures

The BPM was used to test priority measures for existing bus services along the following four corridors:

- Flatbush Avenue (Bus Route B41);
- Nostrand Avenue (Bus Route B44);
- Utica Avenue (Bus Route B46); and
- Cross-town South (Bus Route B82).

The BPM results for the Bus Priority Measures and Bus Priority Measures-Alternative Land Use were compared to the future Baseline Scenario, with the measures of Vehicle Trips, Share of Person Trips by Transit, Vehicle Miles of Travel and Vehicle Hours of Travel. The results were that both scenarios (i.e., Bus Priority Measures under future baseline conditions and under Alternative Lane Use conditions) showed very little change from the future baseline. However, when reviewing results of bus ridership on the specific bus routes, there were significant increases under both scenarios with the priority measures. In the 4-hour AM peak period, there were increases in ridership on the B41, B46 and B82 bus routes between 8% and 12%, while the B44 route showed increases of about 20%.

Passenger Ferry Service

The Passenger Ferry Service scenario includes express service to Manhattan Pier 11 and Downtown Brooklyn from JFKIA, Jacob Riis Park, Floyd Bennett Field, Sheepshead Bay, Coney Island, and Brooklyn Army Terminal, along with local service among all six Brooklyn and Queens locations. BPM results show that the ferry service does not attract sufficient ridership to be a viable option. Contributing issues to the lack of attraction include high fares and low frequencies of service compared to existing bus and subway service, lengthy travel times, and the need for transfers at one or both ends of the ferry trip.

Grade Separation Scenario (Flatbush Avenue and Avenue U)

Since the grade separation is a spot improvement, changes in travel conditions are limited to the immediate area of the improvement. Model results show little to no effect on study area performance measures. However, there would be some re-distribution of traffic demand on the roadways in the immediate area of the improvement as motorists would take advantage of the grade separation.

JFKIA Truck Freight Ferry

An off-line analysis of JFKIA truck freight ferry service was performed; the BPM model is not capable of modeling this option. The hypothetical service locations include:

- Bronx (Hunts Point) and Manhattan
- Newark Airport & northern New Jersey locations.
- Bridgeport, Connecticut, potential connecting service to New Haven or New London.

The results indicated that ferry service is not competitive with trucking. The analysis was made as attractive as possible for ferry service. For example, capital costs related to terminal construction and purchase of vessels were not included in the analysis, nor were berthing fees or administrative costs for the ferry service. Additionally, there are several other issues, such as the limited vertical bridge clearances in Jamaica Bay and environmental suitability of Jamaica Bay and Bergen Basin as factors that would also need to be addressed.

Transit Recommendations

Transit suggestions identified in the study include subway improvements and regional bus Terminal. The subway improvements (e.g., install a pedestrian connection between the Junius and Livonia stations, improve Culver Line express and local service, and extend V train service to Canarsie) have been transmitted to the Metropolitan Transportation Authority (MTA) for consideration in their next 20-year capital needs assessment program, due to be completed in 2009. This needs assessment is a prelude to their next 5-year capital program.

One major issue that arose throughout the study was improving bus service including improving frequency of peak period service, increasing weekend and nighttime service, and extending various bus routes. Those issues were forwarded to the NYCT for their review. Other suggestions for improving bus service along major arterials are being

reviewed in the Bus Rapid Transit Corridor Study, being conducted by the MTA/NYCT, NYCDOT and NYSDOT.

Bike and Pedestrian Recommendations

Bike and pedestrian recommendations include improved pedestrian access to transit and recreational facilities, safety and mobility for pedestrians and bicyclists, bicycle parking at transit and connections for bike routes.

Scenario Viability Matrix (Table ES-1)

The Bus Priority Measures Scenario and the Grade Separation at Flatbush Avenue and Avenue U are viable in terms BPM testing. Although the Grade Separation is viable, there are many issues that would need to be explored, including community and right-of-way impacts. Additionally, pedestrian and bicycle improvements are viable. While the freight and passenger ferry service did not appear viable at this point, it is the policy of the PANY&NJ and other transportation agencies to keep exploring options to look into feasible freight and passenger ferry service.

TABLE ES-1: SBTIS VIABILITY MATRIX - MEDIUM AND LONG TERM TRANSPORTATION IMPROVEMENTS

| Viability of Transportation Scenarios (Viability Based on BPM or Off-Line Testing) | | |
|---|------------------|--|
| Transportation Improvement | Viability | Remarks |
| Pedestrian & Bicycle: Access to Transit & Recreation Network Gaps | Viable | System safety and connectivity |
| Transit: Bus Priority Measures (Impact on existing service) | Viable | Significant potential to increase ridership |
| Roadway: Grade Separation at Avenue U and Flatbush Avenue | Viable | Re-distribution of traffic to Flatbush Avenue |
| Transit: Passenger Ferry Service | Not Viable | Note: It is the policy of agencies to keep exploring options to look into feasible ferry services |
| Freight: JFKIA Truck Freight Ferry | Not Viable | |

STUDY CONCLUSION & NEXT STEPS

This study has served to provide a forum for obtaining area-wide public input on transportation issues and concerns in the Southern Brooklyn study area, along with suggestions for transportation improvements. It has also compiled data and information on Southern Brooklyn’s transportation systems and evaluated improvement scenarios.

Technical memoranda and scenario evaluation results have been distributed to the transportation agency representatives serving on the study’s Technical Advisory

Committee and shared with the public via Community Liaison Committee meetings and the study website. The transportation agencies have actively participated in the study and have been and will continue to consider the improvement suggestions. Additionally, the data and analyses presented in the technical memoranda have served as a resource for other transportation studies (e.g., in the City's *Truck Route Management and Community Impact Study*) and will continue to inform future agency efforts and studies.

Some examples of the agency coordination afforded by this study in addressing transportation issues follow:

- Short Term Issues – Although the SBTIS was concerned with medium and long term improvements, many of the short term issues cited by the public have been addressed by the NYC Department of Transportation.
- Transit Improvements – Major bus and subway transit improvement suggestions have been forwarded to the MTA and NYC Transit. The MTA will consider the improvement suggestions in their next 20-year capital needs assessment program.
- Transit Services – Bus and subway service improvements suggested by the public and the SBTIS Transit Subcommittee have been submitted to and reviewed by NYC Transit.
- Bus Rapid Transit (BRT) – BRT corridors suggested by the public and by members of the study's Transit Subcommittee have been submitted to the team progressing the *New York City Bus Route Transit (BRT) Study*.
- Truck Route Issues – Comments and concerns received from the public have been submitted to the NYC Department of Transportation for use in the *Truck Route Management and Community Impact Study*.

NYMTC is comprised of the agencies that implement transportation improvements and operate the region's transportation systems. Thus, NYMTC will provide an ongoing forum for following up on the information and findings of the Southern Brooklyn TIS through coordination and integration with other studies and with the continuous planning efforts of the member agencies. As conditions in the study area and the region change over time, some of the study's suggestions that were not considered feasible may be reconsidered. When this happens, NYMTC will update the public via its website and newsletters.

Introduction

The Southern Brooklyn Transportation Investment Study (SBTIS) is a multimodal transportation planning study that was undertaken by the New York Metropolitan Transportation Council (NYMTC). The purpose of the study was to assess current and future travel conditions and deficiencies and develop multimodal transportation improvement scenarios that address the movement of people and goods within and through the study area.

The study area boundaries are Linden Boulevard, Caton Avenue, Fort Hamilton Parkway, and 66th Street at Owls Head Park on the north; Belt Parkway/Coney Island on the west and south; and the Brooklyn/Queens Line on the east (see Figure 1). All or portions of Brooklyn Community Boards 5, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18 are included in the study area.

FIGURE 1: STUDY AREA



Study Goals and Objectives

Goals and objectives provide the technical, economic, and environmental basis for undertaking proposed transportation improvements in the study area. The input received from the public through the community involvement program was used to assist in the development of the goals and objectives.

PUBLIC INPUT

Public input consisted of identification of key trends and driving forces within and affecting the study area and visions for a successful transportation system, as well as identification of specific deficiencies and opportunities related to transportation in Southern Brooklyn.

Meeting attendees at the Local Area Visioning sessions noted that population growth and changing land use development are the driving forces and key trends in the study area, which in turn affect transportation. They made the following comments concerning population and development trends:

- Housing densities are increasing (more multi-family housing).
- The population is aging.
- The Brooklyn waterfront is being revitalized for residential and commercial uses.
- The increasing population level will place new demands on the area's transportation system. It will increase the number of cars on area roadways. Additionally, there are increasing numbers of newer residents in the area that do not own cars. The transportation system must adapt to this change.
- There is an increasing amount of development that is occurring away from transit stations.
- Retail activity is increasing in the area, which may affect traffic volumes.
- The increasing numbers of large retail stores in the area will increase truck congestion.

Meeting attendees made the following comments concerning potential transportation impacts that could result from the above trends:

- Population growth will result in an increase in auto usage and an increase in the number of cars on area roadways.
- Increasing numbers of cars and decreasing availability of parking will continue to be a problem.
- Congestion will increase along the Belt Parkway.
- Through traffic will increase in neighborhoods.

- Truck traffic accessing JFK International Airport and the Verrazano-Narrows Bridge will increase.
- Truck traffic for deliveries will increase, with resulting impacts to, and deterioration of, roadways and infrastructure such as sewers.
- Public health may become increasingly impacted by truck traffic and resulting air quality impacts.
- Jitneys (“dollar vans”) will continue to proliferate. Concerns were expressed that jitneys will siphon off ridership from traditional transit services, jitney drivers will continue to ignore rules, both legal and illegal vans will not operate legally, and enforcement activities will not be sufficient.
- Specialized transportation services (e.g., private school buses and vans) will continue growing.

Visions for a successful transportation system were solicited from the public. Comments covered the following issues:

- Quality of life issues must be considered (e.g., safer streets, removal of through trucking from streets, pedestrian safety, security on the transit system, maintenance of transit facilities, and transit accessibility for the elderly and disabled).
- Transit versus roadway priorities should be addressed.
- Pricing strategies should be considered, including integrated fare systems (e.g., MetroCard integrated with LIRR and MetroCard tied to E-Z Pass) to improve convenience and to increase off-peak, reverse commutation.
- Increase convenience and utilization of the existing transportation systems through better intermodal connections, improved regional bus service, direct interborough services between transit hubs in Brooklyn and Queens, more frequent transit services, and expanded off-peak (night and weekend) service on buses and subways.
- Improve and expand transportation services by increasing ferry services, extending rapid transit service in Brooklyn and Queens, using the Bay Ridge Branch right-of-way for transit and freight, designating bus lanes along major corridors, and expanding the Belt Parkway with additional travel lanes and shoulders (but maintaining the present truck restrictions).
- Consideration should be given to provision of east-west boulevards, creation of new bicycle lanes and facilities, better enforcement of traffic and parking regulations (e.g., double-parked vehicles, parking restrictions, and running of red lights), and improved access to, and availability of, parking.

GOALS & OBJECTIVES

Goal 1

Make more efficient use of the region's transportation systems for travel within the study area and beyond through greater connectivity and intermodalism.

Objectives

- Improve existing intermodal transportation linkages.
- Initiate new services to provide system connectivity.
- Promote intermodalism by revising pricing and fare policies to allow for integrated tolling and pricing mechanisms.
- Increase weekend and nighttime transit service to provide better access to employment, recreation, and cultural destinations.

Goal 2

Expand or extend existing transit systems to underserved, unserved, and growing areas within the study area to promote more efficient movement of people and to support economic vitality.

Objectives

- Provide or improve transit access to major residential and commercial areas that are unserved or underserved.
- Provide or improve transit access to areas of major population and economic growth.

Goal 3

Improve existing transportation systems to encourage more efficient movement of people and goods and to support economic vitality.

Objectives

- Encourage shift from single-occupant vehicles to more efficient modes of transportation (transit, carpools, and non-motorized transportation).
- Establish pricing and other controls that encourage transit use and carpooling.
- Provide or improve access to areas of major population and economic growth.
- Encourage mode shift to most efficient means of goods delivery.
- Provide reasonable levels of service for goods movement and delivery (e.g., access to loading/unloading areas).

Goal 4

Manage system-wide congestion.

Objectives

- Provide reasonable levels of service (i.e., speed, travel time, enhanced transit transfers, comfort and convenience) for people movement.
- Provide reasonable levels of service (i.e., speed, travel time and convenience) for goods movement.

Goal 5

Improve quality of life and address environmental issues.

Objectives

- Help achieve federal and state air quality standards.
- Encourage non-motorized travel.
- Improve neighborhood circulation through measures that increase residential parking availability.
- Improve pedestrian safety and reduce vehicular speeding.
- Improve security on transit vehicles and at transit facilities.
- Improve transportation options for the elderly and disabled.
- Improve maintenance of, and provide beautification for, transportation facilities.

Existing Conditions

This chapter summarizes socioeconomic conditions, environmental conditions, transit, goods movement, accidents and safety, and bicycle and pedestrian transportation within the study area.

SOCIOECONOMIC CONDITIONS

The study area comprises nearly half of the Borough of Brooklyn and houses a population of 1.2 million. Its diverse neighborhoods range from low-scale single-family home neighborhoods – such as Dyker Heights, Marine Park, and Mill Basin – to higher density neighborhoods such as portions of Coney Island, Flatbush, and Starrett City. The character of the area is defined by historic neighborhoods and corridors, such as Ocean Parkway and Kings Highway, and world class recreational and entertainment attractions, such as the Coney Island Boardwalk and Amusement Park, and Gateway National Recreation Area. Its waterfront, while not easily accessible to some inland communities, provides a wealth of natural resources and a distinct maritime character in areas such as in Sheepshead Bay.

The study area experienced a greater increase in population between 1990 and 2000 (11 percent) than Brooklyn (seven percent) or New York City (nine percent), and has grown increasingly diverse in its racial and ethnic composition. The study area has a slightly older population on average than the rest of Brooklyn and New York City, with some neighborhoods having concentrations of residents above the age of 65, such as Bay Ridge, Coney Island and Sheepshead Bay. Households within the study area have slightly higher median incomes on average (\$38,447) than the rest of Brooklyn and have higher rates of multiple-vehicle ownership (52 percent). While the most popular mode of commutation for workers in the study area is transit (52 percent), a higher percentage of workers within the study area commuted to work by automobile (40 percent) than in Brooklyn as a whole, or New York City (32 percent and 26 percent, respectively).

The study area also contains major employment sites, such as hospitals and colleges, Kings Plaza, which is one of the largest shopping centers in New York City, and the Brooklyn Terminal Market, a major food distribution facility. Land use in the study area, while primarily residential, also includes mixed use corridors and neighborhoods, such as Borough Park, and the Spring Creek and Old Mill Creek neighborhoods, where industrial uses are interspersed with residences in some locations. Recent development has focused on waterfront areas, with the introduction of big box type retailers such as Home Depot, and the largest retail development in the Borough in decades – Gateway Estates Shopping Center. Gateway Estates in particular, which opened in October 2002 with nearly half a million square feet of retail space, presents issues related to transit accessibility for its patrons, and for its total of 1,700 employees. Other recent developments, such as Keyspan Stadium, have increased the range of attractions in southern Brooklyn.

ENVIRONMENTAL CONDITIONS

Environmental issues for consideration in the development and evaluation of alternative transportation improvements include types and locations of community facilities, sensitive land uses, cultural resources, visual resources, air quality, noise, vibration, natural resources, hazardous materials and the locations of minority, low income and disabled populations for environmental justice considerations. Major activity generators within the study area include cultural and entertainment facilities such as the New York Aquarium, Canarsie Pier, and Gateway National Recreation Area; colleges including Brooklyn College and Kingsborough Community College; hospitals such as Coney Island Hospital, Kings County Hospital and SUNY Downstate Medical Center, and retail centers such as Kings Plaza and Gateway Estates. The area contains numerous historic resources, including three historic districts, and one of the oldest homes in New York City, the Pieter Claeson Wycoff House (circa 1652). Southern portions of the study area along the waterfront have also been identified as being archeologically sensitive, with evidence of prehistoric occupation in some areas. Visual resources include scenic waterfront vistas, as well as Ocean Parkway, which are protected by a Special Purpose zoning district. Other special purpose districts present that are intended to protect the area's unique community character include the Special Bay Ridge District, the Special Sheepshead Bay District and the Coney Island Special District.

Environmental concerns that have been inventoried include superfund sites such as the Brooklyn Gas Works site, and former landfill sites adjacent to the Belt Parkway that are now being remediated and prepared for use as parkland. Air Quality concerns have been expressed by community members, particularly in areas that are impacted by transportation, industrial and distribution-related uses, such as the eastern portion of the study area.

TRANSIT SYSTEM USAGE AND OPERATION

The Southern Brooklyn study area is served by a variety of transit modes that provide residents with a number of options for traveling within Brooklyn, connecting to other boroughs and accessing the region beyond New York City. These transit modes include subways, buses, ferries, commuter vans and jitneys. Commuter rail services in the region do not directly serve the Southern Brooklyn area.

There is a lack of rapid transit in the southeastern part of the study area, including lower Nostrand Avenue, lower Flatbush Avenue, and Utica Avenue, which in part contributes to heavy utilization of the stations closest to this area, which are the Brighton Avenue (Q) Line stations (approximately 100,000 riders per day), as well as the Brooklyn College-Flatbush Avenue station on the Nostrand Avenue (Nos. 2 and 5) Line (approximately 18,000 riders per day). Other subway issues include creating additional subway-to-subway transfers and the potential for greater utilization of express tracks on many of the subway lines which provide service in Southern Brooklyn.

There are 47 local, limited, and express bus routes in operation through the Southern Brooklyn study area, including five routes that are among the top ten most utilized routes in the city. These include three north/south routes – B41, B44, and B46 – that serve three

major corridors lacking subway service. All three of these routes average greater than 40,000 passengers per day. Other surface transit issues that have been identified include slow operating speeds averaging eight miles per hour for routes in the project area, instances of passenger crowding on buses at peak times, and bus bunching on heavily traveled corridors.

Additional modes and facilities, including jitney vans, ferries, and park and ride lots were investigated. Jitney van activity was observed at locations throughout the study area. At each of three of those locations (Flatbush/Church, Flatbush/Nostrand and Kings Plaza), there were 75 instances of jitney van activity in a three-hour period. This emphasizes the demand for transit and the lack of direct subway access in the southeastern portion of the study area. Jitney vans are filling a need in these areas, but were observed to operate in ways that cause impediments to the transportation network, such as double parking and standing in bus stops.

Despite its extensive waterfront, ferries serve only one location the study area. Brooklyn Army Terminal to Lower Manhattan ferry service was initiated shortly after September 11, 2001.

There are eight Park and Ride lots in the study area, which provide opportunities for commuters to access transit facilities. Most of these lots are currently underutilized.

A number of general issues have emerged related to transit as a result of a literature review, on-site observations, public outreach and agency correspondence and data sources. These include the following:

- Lack of rapid transit service along major corridors in Southern Brooklyn
- Underutilization of express subway track capacity
- Need for increased transfer opportunities between subway lines
- Passenger crowding on bus routes
- Slow bus operating speeds
- Need for bus stop amenities
- Proliferation of jitney services
- Potential to increase ferry service in Southern Brooklyn
- LIRR Brooklyn Branch reverse commute service
- Improved connections to JFKIA
- Service to Gateway Estates, a new commercial-residential development
- Underutilization of Park and Ride Lots

GOODS MOVEMENT

Freight distribution in the Southern Brooklyn study area is served by highway, rail, and waterborne modes. The highway system consists of an extensive network of secondary streets and a less extensive system of primary arterials and limited access highways. Of the approximately 780 road miles of streets and highways in the study area, roughly 63.7 miles, or 8.2 percent, are legally designated truck routes. Approximately 7 percent of the total road miles are available for local truck use and roughly 1 percent – principally

I-278, Prospect Expressway, and Flatbush Avenue – are available for through truck use. The rail system within the study area consists of approximately 6.5 miles of the Bay Ridge Branch, a freight rail line connecting the South Brooklyn waterfront with Fresh Ponds Yard in Queens. Rail service in the study area is limited – with approximately seven trains each week moving freight for customers in Brooklyn to and from the float bridge across New York Harbor to New Jersey and to Queens where freight makes connections to West-of-Hudson origins and destinations. There are no public (i.e., facilities that serve multiple freight shippers and carriers) marine cargo terminals in the SBTIS study area. However, there are three public marine cargo facilities elsewhere in Brooklyn that impact, to a limited extent, the SBTIS study area. Those terminals are the Red Hook Marine Terminal, the Brooklyn Marine Terminal, and the South Brooklyn Marine Terminal. In addition to public facilities, there are 52 privately owned marine terminals and special purpose publicly owned facilities (Navy, Coast Guard, and New York City Department of Sanitation) within Kings County. Air cargo facilities at nearby JFKIA impact Southern Brooklyn by generating truck trips through the study area.

Analysis of commodity flow data for the Borough shows that over 143 million tons of freight valued at \$353 billion moved inbound, outbound, through, and within Brooklyn in 2000. The top commodity class by tonnage is petroleum and coal products. The next highest tonnage classes are food and kindred products; and clay, concrete, glass, and stone products. The highest value commodity classes are machinery, apparel, and food and kindred products. The top direction of movement is inbound, accounting for 45 percent of total tonnage. Outbound, through, and internal movement of freight account for 39 percent, 15 percent and 1 percent, respectively, of the total tonnage. Trucks carry greatest amount of freight of any mode, with 76.2 percent of the tonnage and 94.6 percent of the total value. Waterborne freight movement is second and rail is third representing 27.2 percent and 0.5 percent of the total tonnage, respectively.

Analysis of a trip table of auto and truck activity in the study area created from the NYMTC Best Practices Model reveals concentrations of freight trip generation within Southern Brooklyn. Specifically, the model data reveal that traffic analysis zones near the Kings Plaza Shopping Area, Brooklyn Terminal Market, and Fort Hamilton area have the highest estimated truck activity in terms of inbound and outbound tonnage and percentage of trucks. A database of freight related business locations affirms the concentrations of freight activity in the study area and shows several additional freight activity centers in Southern Brooklyn.

Interviews and focus group activities with freight system users – including outreach activities from related studies – identified the following types of issues and concerns in the study area: poor truck access and vertical clearance at elevated rapid transit structures; inadequate signage; problems with truck rules enforcement; traffic congestion; and environmental and safety issues. These issues are being addressed in the New York City Department of Transportation's *Truck Route Management and Community Impact Study*.

ACCIDENTS AND SAFETY

Accident patterns show that certain roadway corridors in Southern Brooklyn are more accident-prone than others. Preliminary analyses reveal that these corridors are primarily major roadways and truck routes. While the top 120 high accident locations represent only 1 percent of all accident locations, the number of accidents that occurred at these top high accident locations accounts for 13 percent of the total accidents within the Southern Brooklyn study area. This finding shows that these high accident locations, having a disproportionate amount of accidents, are more accident-prone than other accident locations within Southern Brooklyn.

PEDESTRIAN AND BICYCLE TRANSPORTATION

With the exception of Belt Parkway and the Gowanus Expressway, cyclists and pedestrians share Southern Brooklyn's entire local and arterial street network with motorists. Many cyclists even use major arterials such as Flatbush Avenue and Linden Boulevard for their connectivity and centrality. In addition, cyclists have a formal bicycle network in Southern Brooklyn of signed routes (Class III facilities), marked on-street bike lanes (Class II facilities), and physically separated, off-street bicycle paths (Class I facilities). As with bicycling, pedestrian activity is extant across the study area, but is particularly concentrated along the busy shopping corridors, around subway stations, and adjacent to intermodal stops.

Development of the greenway and bicycle lane network by the New York City Department of Transportation in Southern Brooklyn has focused on reconstructing deteriorated sections, closing gaps between existing greenway segments, expanding the current greenway routes, and establishing an on-street network. Efforts to improve the pedestrian network in Southern Brooklyn have focused on improving safety and access adjacent to transit nodes and along retail corridors, and installation of pedestrian ramps at crosswalks.

Cycling and walking are increasingly popular ways to get to work for people in Southern Brooklyn. According to the US census, between 1990 and 2000 cycling to work increased by 82 percent and walking increased by 7 percent. The rate of non-motorized commuting is highest in the center of the study area (Community Boards CB12, CB 14 and CB 10) but the greatest numbers of cyclists come from northern end of the study area (CB 17). Despite the increases in walking and cycling, safety continues to be a major concern in many parts of Southern Brooklyn. Pedestrian accidents occurred most frequently along Flatbush Avenue, Nostrand Avenue, Church Avenue, Flatlands Avenue, Bay Parkway and Linden Blvd. Five of the top 10 most accident-prone locations for bicyclists were on major streets that feed the Shore Parkway Greenway. One of the top 10 bicycle accident locations, the intersection of Caton Avenue and Bedford Avenue, is associated with a bicycle lane.

Access to transit and retail corridors is another area of concern for pedestrians and cyclists in Southern Brooklyn. Bicycle parking at employment centers, retail areas, and at transit nodes are some of the major issues for cyclists.

A literature search, conversations with agency representatives, and concerns expressed by the public provided information necessary to identify the following common themes and issues with the current pedestrian and bicycle environment in Southern Brooklyn:

- Insufficient or unsafe access to Greenways from the local street network and surrounding communities.
- No bicycle routes in the northeastern section of the study area.
- Accident prone and inhospitable walking and cycling environment of arterials.
- No crosstown bicycle routes.
- Congestion, gaps and barriers in the sidewalk network.
- Through and truck traffic on neighborhood streets.
- Need for increased safety and comfort of access to transit.
- Lack of secure bicycle parking at transit and employment centers.

Scenario Development

Multimodal scenarios were developed to encompass all modes of travel (bus and rail transit, auto, truck, walk, bike and ferry) to address the existing and future transportation deficiencies of the study area. The study area is heavily populated and most of the residents depend on the transit system to commute to work. Travelers are affected by deficiencies in the transportation system. For example, truckers have no through routes to traverse or serve the study area, transit users must transfer between buses and subway stations in the eastern portion of the study area, and many arterial streets are congested.

IDENTIFICATION OF ALTERNATIVE IMPROVEMENTS

Scenario development began with obtaining suggestions for transportation improvements from the community. The SBTIS featured a proactive public and community involvement program. Community involvement efforts included visioning sessions with the general public, transportation agencies, local and elected officials, business organizations and other stakeholders. Input obtained at the sessions, along with comments received at resident and business focus groups and through the SBTIS website, e-mails and letters, have helped to define the study area's transportation problems and to obtain suggestions for short, medium and long-term improvements.

JOINT TAC/CLC SUBCOMMITTEES

The Study's Technical Advisory Committee (TAC) and Community Liaison Committee (CLC) provide agency and public input to the SBTIS. Four subcommittees were formed from the memberships of the TAC and CLC to process the public input and organize the improvement suggestions to assist in the development of multimodal scenarios. The four Joint TAC/CLC Subcommittees are:

- **Goods Movement** - Long haul trucking and local deliveries, truck routing, waterborne freight, rail freight, JFKIA air cargo access.
- **Transit** - Local and express bus services, rail rapid transit, vanpools/carpools, jitney/dollar vans, ferries.
- **Local Circulation / Parking / Bicycle & Pedestrian** - Traffic and pedestrian safety, bicycle traffic, intersections.
- **Travel Management** - Travel Demand Management (TDM) to increase the number of passengers per vehicle, Transportation Management Systems (TMS) to increase the efficiency of existing transportation systems, Intelligent Transportation Systems (ITS) consisting of technology-based measures to increase the efficiency of existing roads, High Occupancy Vehicle (HOV) lanes to encourage carpooling.

TRANSPORTATION SCENARIO DEVELOPMENT

To organize the improvement suggestions and manage the process of developing multimodal scenarios, subcommittee members undertook the following tasks: 1) grouping

of suggested improvements; 2) organizing the groups into potential improvement scenarios; and 3) developing a consensus list of potential improvement scenarios for evaluation.

Improvement suggestions were summarized on index cards. Each Subcommittee grouped the cards to find patterns or commonalities. This technique, used to organize large amounts of information, is called the “affinity diagram” method. Once the cards were placed into consensus groups that captured the central idea of the cards, the group was named on a “header” card. The header cards represented the functional objectives of the subcommittees. The functional objectives developed by each of the subcommittees are listed below.

Goods Movement

- Improve transfer station options
- Reduce air and noise pollution
- Improve regional freight access and goods movement
- Improve truck access to commercial sites and freight terminals
- Resolve truck routing issues
- Enforce truck height, weight and width regulations
- Mitigate truck-car parking conflicts
- Rationalize truck parking regulations
- Improve truck signage

Transit

- Develop and promote existing and new ferry services
- Address operational issues with local and limited stop buses to improve service
- Reduce service gaps by restructuring bus routes and by serving new corridors where warranted by demand
- Increase service levels of existing Brooklyn to Manhattan express bus routes
- Address deficiencies and take advantage of opportunities of the existing subway network
- Move forward with subway infrastructure improvements that increase track capacity and improve service
- Improve physical access to and physical connections between subway stations
- Create and improve transit connections between the study area and regional airports
- Modify LIRR Atlantic Avenue Branch service to enable study area residents to make better use of it to access other parts of the region
- Create a Brooklyn bus terminal to accommodate regional and intercity routes

Local Circulation / Parking / Bicycle & Pedestrian

- Improve bicycle facilities to encourage bicycle use
 - Connect existing facilities, fill in gaps and improve access to existing bicycle paths
 - Improve access to transit
- Improve safety for pedestrians, cyclists and motorists
 - Address speeding on arterials
 - Address speeding and through traffic on neighborhood streets
 - Correct unsafe roadway conditions
 - Address truck impacts
 - Improve traffic safety at Belt Parkway entrances and exits
 - Improve pedestrian safety and mobility
- Improve traffic signals and signs
 - Review signal synchronization and timing, with consideration for pedestrians and bicyclists
 - Study turning movement conflicts
 - Add, remove or move traffic signals and signs
- Correct inappropriate parking
 - Enforce parking and double parking rules; especially on bus routes
 - Encourage curb parking turnover
- Desire for additional parking
 - Use underutilized municipal lots more effectively
 - Increase number of curb spaces
- Reduce traffic congestion
 - Identify congested corridors and locations

Travel Management

- Rationalize and manage freight movement
- Reduce single-occupant vehicle travel
- Improve travel in the Gowanus Expressway corridor
- Provide parity in pricing for Brooklyn residents on the Verrazano-Narrows Bridge
- Increase and improve ferry service
- Coordinate traffic devices to improve flow
- Improve travel along the Belt Parkway
- Encourage and support bicycle usage
- Improve area-wide transit connections

The process of organizing the groups into potential improvement scenarios began by categorizing the transportation issues and suggestions for improvements as being either of short-term or medium/long-term concern. The medium and long-term items were then reviewed for possible evaluation as part of a multimodal scenario, while the short-term issues were removed from the groups for separate consideration.

CONSENSUS LIST OF IMPROVEMENTS

The medium and long-term items were reviewed by committee members as the basis for developing a consensus list of transportation improvements. SBTIS committees operated on the basis of consensus. Consensus meant that all TAC, CLC and subcommittee members were able to accept the items as part of the transportation improvement scenarios.

The transportation scenarios are:

- Bus Priority Measures – priority measures to improve existing bus service along four corridors (Figure 2)
- Passenger Ferry Service – express and local service with five new landings to access Downtown Brooklyn and Manhattan (Figure 3)
- Grade Separation at Flatbush Avenue and Avenue U – roadway grade separation for Flatbush Avenue through traffic to avoid the congested intersection (Figure 4)
- JFKIA Truck Freight Ferry – freight ferry service to the Bronx, Manhattan, northern New Jersey and Connecticut (Figure 5)
- Subway Improvements – improved service, service extensions, pedestrian connections and subway construction (Figures 6 and 7)
- Downtown Brooklyn Regional Bus Terminal – terminal for regional and, possibly, intercity routes (Figure 7)
- Bus Rapid Transit (BRT) – BRT services along six corridors, including the four corridors proposed for bus priority measures (Figure 8)
- Non-motorized Modes – recommendations covering bicycling and walking modes of travel

Most of the transportation scenarios relate to transit improvements, including implementation of bus priority measures, improvements to the subway system, initiation of passenger ferry services and establishment of a regional bus terminal. There are also scenarios that relate to roadway and freight improvements. Additionally, an Alternative Land Use scenario was developed for testing the transportation scenarios with a greater amount of development in and around the Downtown Brooklyn area than included in the 2025 future baseline scenario.

FIGURE 2: BUS PRIORITY CORRIDORS

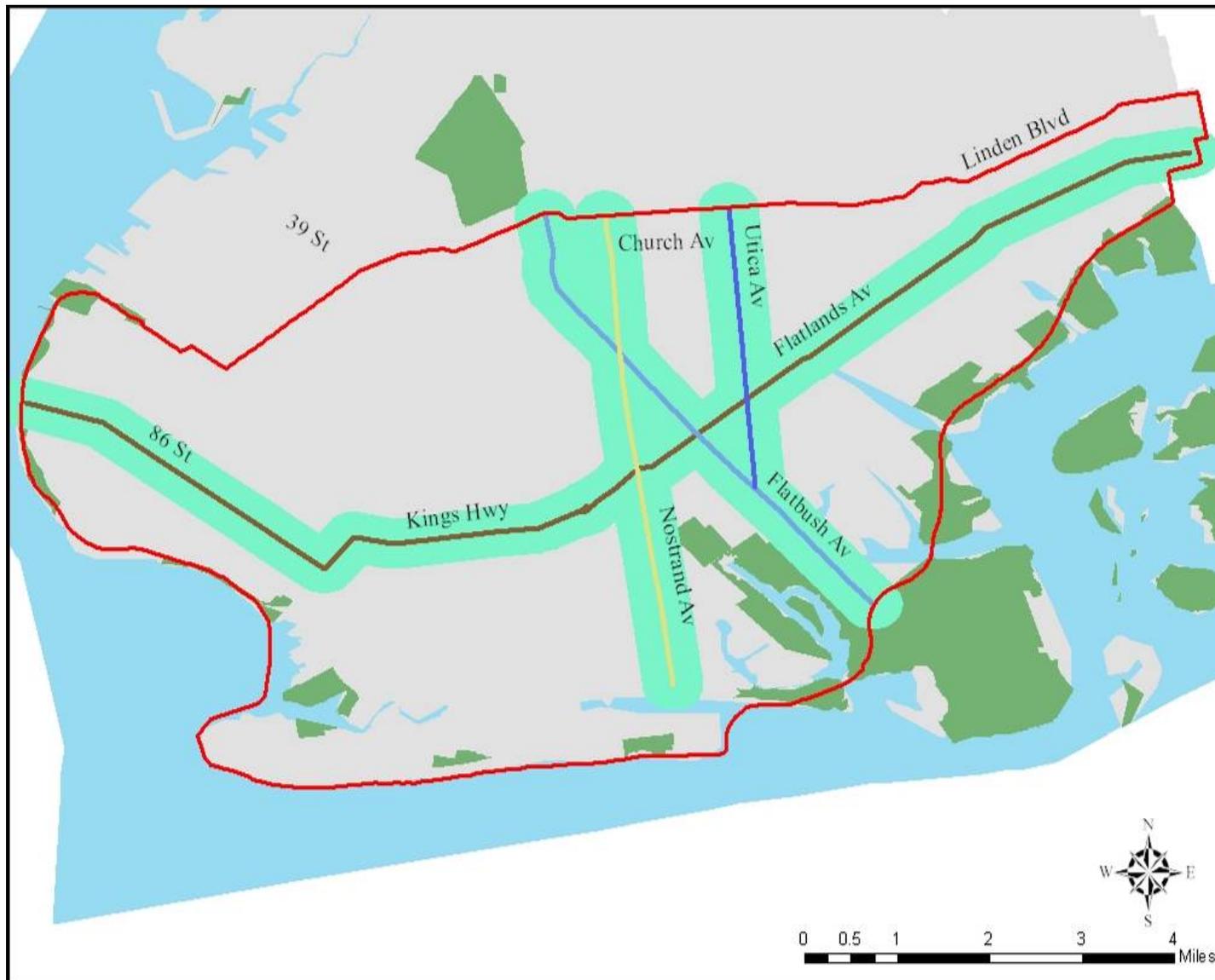


FIGURE 3: PASSENGER FERRY SERVICE



FIGURE 5: HYPOTHETICAL JFKIA FREIGHT FERRY SERVICE CORRIDORS

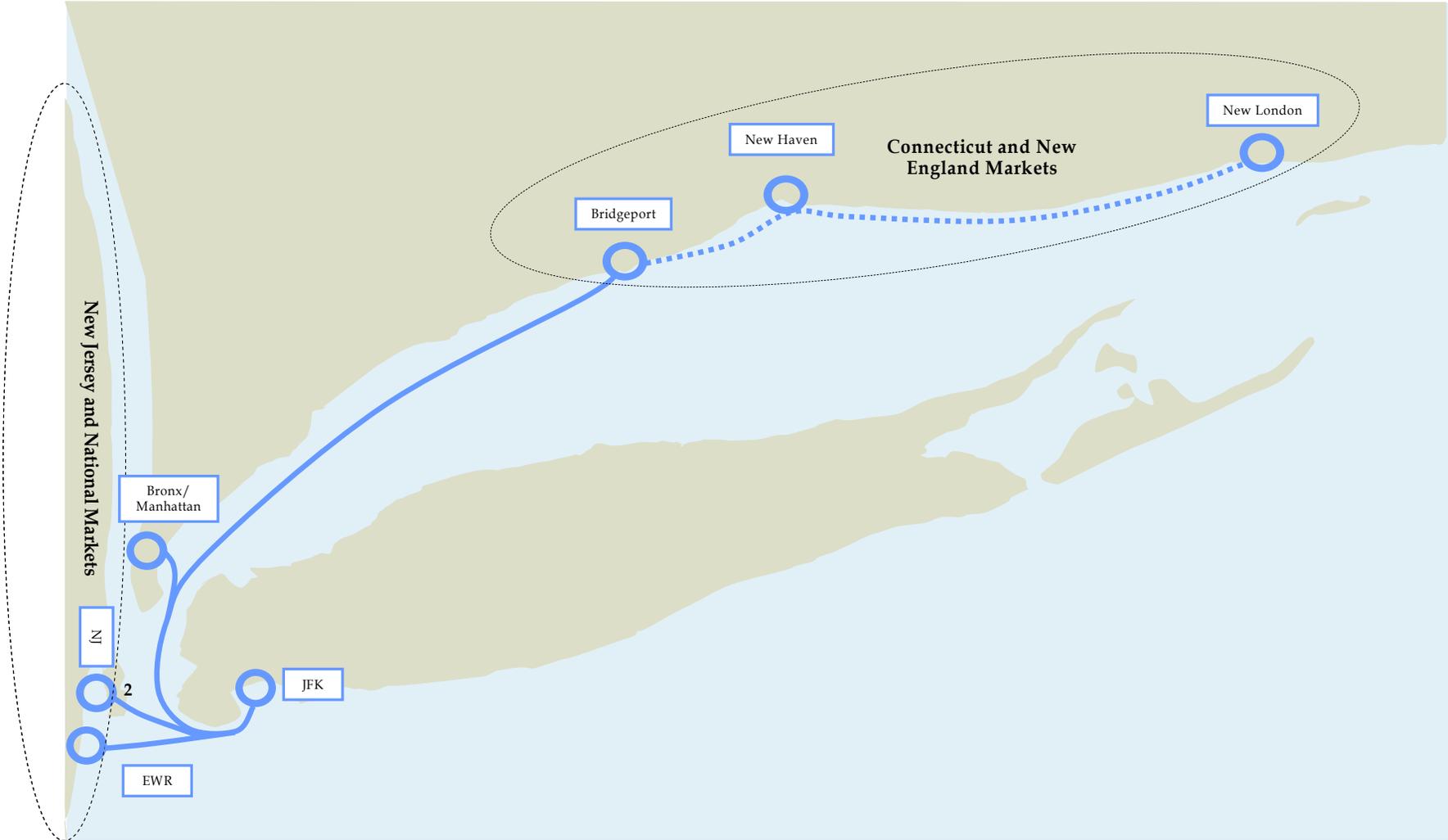


FIGURE 6: POTENTIAL SUBWAY IMPROVEMENTS

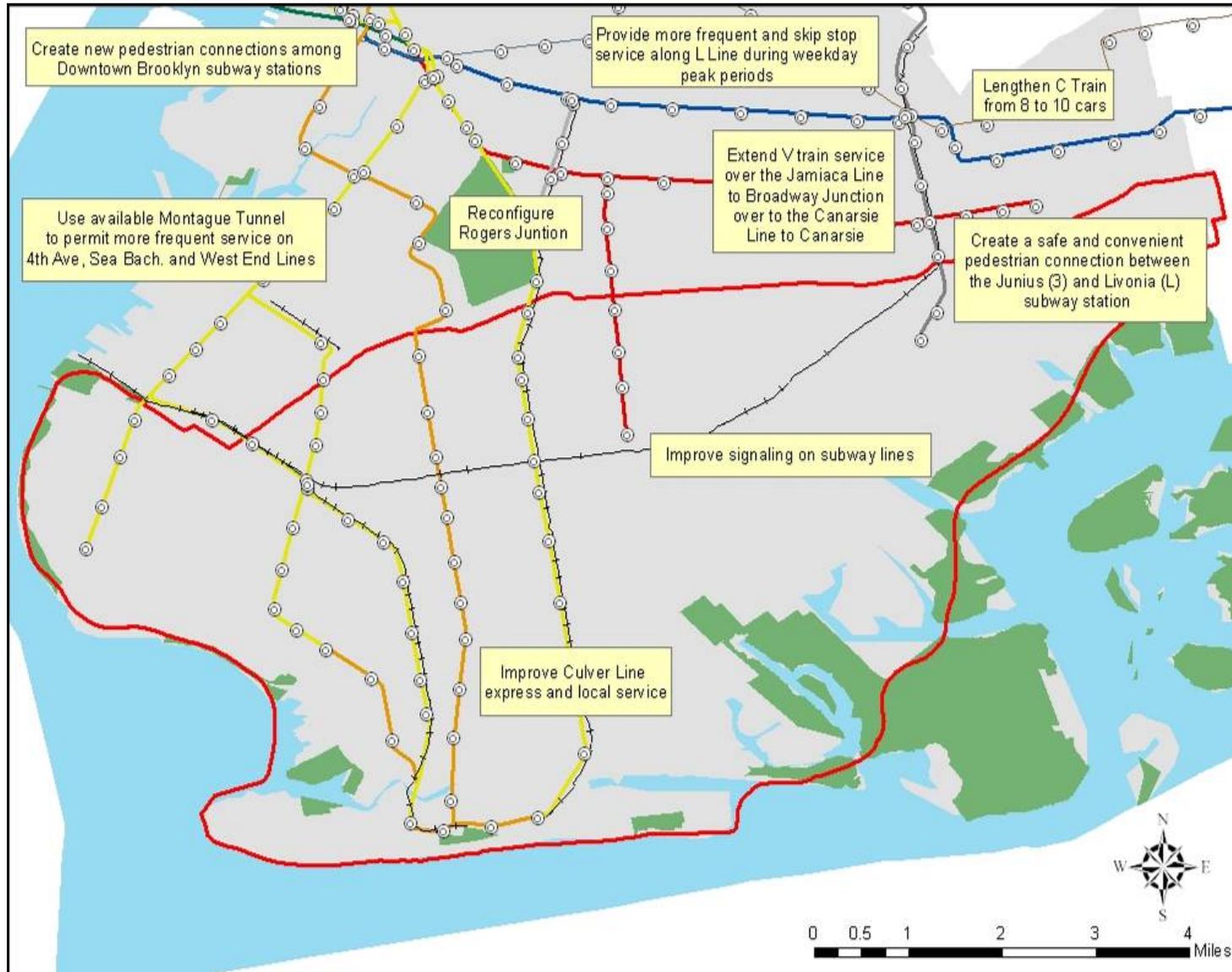


FIGURE 7: POTENTIAL SUBWAY CONSTRUCTION

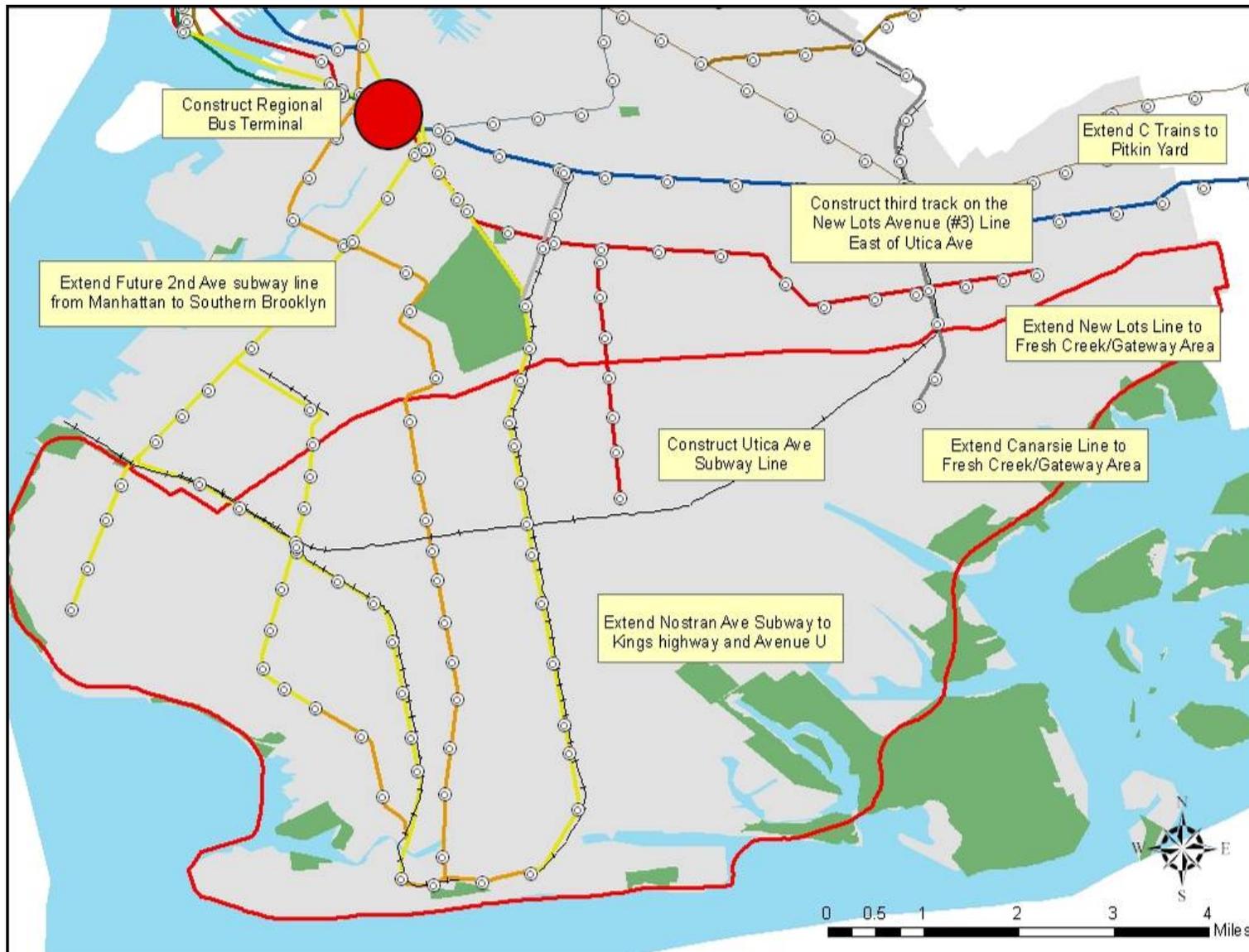
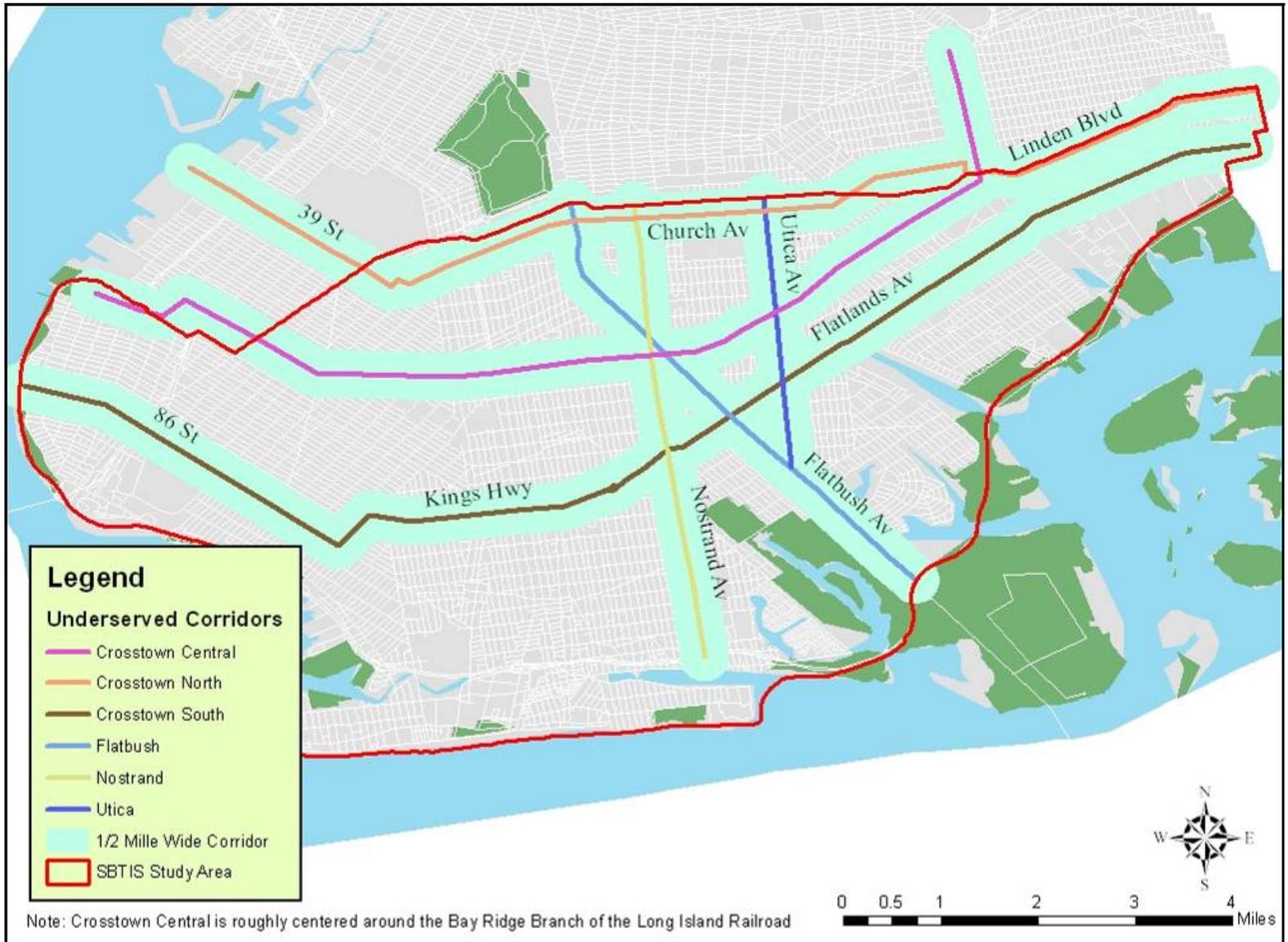


FIGURE 8: BUS RAPID TRANSIT CORRIDORS



Evaluation of Scenarios

The consensus list of multimodal improvements were evaluated on the basis of how well they meet study goals and objectives. Goals and objectives provide the basis for undertaking transportation improvements. Performance measures provide the quantitative basis for estimating the effectiveness of the improvements. The goals, objectives and performance measures were developed early in the study to reflect an area-wide approach. Many of the transit improvement suggestions reflect this areawide approach. These suggestions, such as expansion of subway service, new bus rapid transit services and implementation of bus priority measures would be expected to meet study goals to make more efficient use of the region’s transportation systems, expand or extend existing transit systems to promote more efficient movement of people, improve existing transportation systems to encourage more efficient movement of people, manage system-wide congestion and improve quality of life.

The consensus list of transportation improvements have been categorized as to how they were considered in the study (see Table 1). Some improvements were tested using NYMTC’s Best Practice Model (BPM), while others were not tested in this study or were tested by another method.

TABLE 1: SBTIS SCENARIO MATRIX - MEDIUM AND LONG TERM TRANSPORTATION IMPROVEMENTS

| Scenarios Tested by NYMTC’s Best Practice Model (BPM) | | |
|---|--|---|
| Transportation Improvement | 2025 Baseline Land Use Scenario | 2025 Alternative Land Use Scenario |
| 2025 Baseline Transportation Scenario | X | X |
| Transit Bus Priority Measures (Impact on existing service) | X | X |
| Transit Passenger Ferry Service | X | X |
| Roadway Grade Separation at Flatbush Avenue and Avenue U | X | N/A |
| Transportation Improvement Tested Off-Line | | |
| Freight JFKIA Truck Freight Ferry | | |
| Improvements forwarded to MTA and Other Agencies for their Consideration (These improvements were not tested in the SBTIS) | | |
| Transit Subway Improvements Downtown Brooklyn Regional Bus Terminal Bus Rapid Transit Services | | |

Testing and evaluation of the transit suggestions, except for bus priority measures and passenger ferry services, were not performed in this study. Transit improvement suggestions were forwarded to the MTA and NYCT for further consideration.

Roadway improvement suggestions received from the public covered all of the major arterials and numerous intersections throughout Southern Brooklyn. However, most of the suggestions were for short term improvements and increased enforcement of traffic and parking regulations. The suggestions would be expected to meet the goals and objectives relating to transportation system efficiency, management of congestion and quality of life (safety) issues.

EVALUATION OF SCENARIOS AND RESULTS

The improvement scenarios that were tested in this study include Bus Priority Measures, Passenger Ferry Service, Grade Separation at Flatbush Avenue and Avenue U, and JFKIA Truck Freight Ferry. The first three scenarios were tested using NYMTC's Best Practice Model, while the JFKIA Truck Freight Ferry scenario was tested using another method. The BPM also was used to compare the future 2025 Baseline to the 2002 Base Year and to compare the Alternative Land Use Scenario to the 2025 Baseline Scenario.

2025 Baseline Compared to 2002 Base Year

Most measures, such as Vehicle Miles of Travel (VMT) and Vehicle Hours of Travel (VHT) increased in both Brooklyn and the SBTIS study area, with truck traffic showing greater percentage increases compared to all vehicular traffic. For example, AM peak period truck VMT within the study area increased by 24%, compared to an increase of 7.5% for total vehicular traffic.

Alternative Land Use Scenario Compared to 2025 Baseline

The results for the Alternative Land Use Scenario were similar to the 2025 Baseline with only very slight decreases in total vehicle trips, VMT and VHT, and a slight increase in the transit share of total person trips. The slight decreases in vehicular travel and increase in transit share under the Alternative Land Use Scenario are a result of additional concentrations of activities and development in and around the Downtown Brooklyn area.

Bus Priority Measures

The BPM was used to test priority measures for existing bus services along the following four corridors:

- Flatbush Avenue (Bus Route B41);
- Nostrand Avenue (Bus Route B44);
- Utica Avenue (Bus Route B46); and
- Cross-town South (Bus Route B82).

The BPM results for the Bus Priority Measures and Bus Priority Measures-Alternative Land Use were compared to the future Baseline Scenario, with the measures of Vehicle

Trips, Share of Person Trips by Transit, Vehicle Miles of Travel and Vehicle Hours of Travel. The results were that both scenarios (i.e., Bus Priority Measures under future baseline conditions and under Alternative Lane Use conditions) showed very little change from the future baseline. However, when reviewing results of bus ridership on the specific bus routes, there were significant increases under both scenarios with the priority measures. In the 4-hour AM peak period, there were increases in ridership on the B41, B46 and B82 bus routes between 8% and 12%, while the B44 route showed increases of about 20%.

Passenger Ferry Service

The Passenger Ferry Service scenario includes express service to Manhattan Pier 11 and Downtown Brooklyn from JFKIA, Jacob Riis Park, Floyd Bennett Field, Sheepshead Bay, Coney Island, and Brooklyn Army Terminal, along with local service among all six Brooklyn and Queens locations. BPM results show that the ferry service does not attract sufficient ridership to be a viable option. Contributing issues to the lack of attraction include high fares and low frequencies of service compared to existing bus and subway service, lengthy travel times, and the need for transfers at one or both ends of the ferry trip.

Grade Separation Scenario (Flatbush Avenue and Avenue U)

Since the grade separation is a spot improvement, changes in travel conditions are limited to the immediate area of the improvement. Model results show little to no effect on study area performance measures. However, there would be some re-distribution of traffic demand on the roadways in the immediate area of the improvement as motorists would take advantage of the grade separation.

JFKIA Truck Freight Ferry

An off-line analysis of JFKIA truck freight ferry service was performed; the BPM model is not capable of modeling this option. The hypothetical service locations include:

- Bronx (Hunts Point) and Manhattan
- Newark Airport & northern New Jersey locations.
- Bridgeport, Connecticut, potential connecting service to New Haven or New London.

The results indicated that ferry service is not competitive with trucking. The analysis was made as attractive as possible for ferry service. For example, capital costs related to terminal construction and purchase of vessels were not included in the analysis, nor were berthing fees or administrative costs for the ferry service. Additionally, there are several other issues, such as the limited vertical bridge clearances in Jamaica Bay and environmental suitability of Jamaica Bay and Bergen Basin as factors that would also need to be addressed.

Transit Recommendations

Transit suggestions identified in the study include subway improvements and regional bus Terminal. The subway improvements (e.g., install a pedestrian connection between the Junius and Livonia stations, improve Culver Line express and local service, and extend V train service to Canarsie) have been transmitted to the Metropolitan Transportation Authority (MTA) for consideration in their next 20-year capital needs assessment program, due to be completed in 2009. This needs assessment is a prelude to their next 5-year capital program.

One major issue that arose throughout the study was improving bus service including improving frequency of peak period service, increasing weekend and nighttime service, and extending various bus routes. Those issues were forwarded to the NYCT for their review. Other suggestions for improving bus service along major arterials are being reviewed in the Bus Rapid Transit Corridor Study, being conducted by the MTA/NYCT, NYCDOT and NYSDOT.

Bike and Pedestrian Recommendations

Bike and pedestrian recommendations include improved pedestrian access to transit and recreational facilities, safety and mobility for pedestrians and bicyclists, bicycle parking at transit and connections for bike routes.

SCENARIO VIABILITY

The Bus Priority Measures Scenario and the Grade Separation at Flatbush Avenue and Avenue U are viable in terms BPM testing. Although the Grade Separation is viable, there are many issues that would need to be explored, including community and right-of-way impacts. While the freight and passenger ferry service did not appear viable at this point, it is the policy of the PANY&NJ and other transportation agencies to keep exploring options to look into feasible freight and passenger ferry service. Additionally, pedestrian and bicycle improvements are viable. Scenario viability is summarized in Table 2.

TABLE 2: SBTIS VIABILITY MATRIX - MEDIUM AND LONG TERM TRANSPORTATION IMPROVEMENTS

| Viability of Transportation Scenarios (Viability Based on BPM or Off-Line Testing) | | |
|---|------------------|---|
| Transportation Improvement | Viability | Remarks |
| Pedestrian & Bicycle: Access to Transit & Recreation Network Gaps | Viable | System safety and connectivity |
| Transit: Bus Priority Measures (Impact on existing service) | Viable | Significant potential to increase ridership |
| Roadway: Grade Separation at Avenue U and Flatbush Avenue | Viable | Re-distribution of traffic to Flatbush Avenue |
| Transit: Passenger Ferry Service | Not Viable | Note: It is the policy of agencies to keep exploring options to look into feasible ferry services |
| Freight: JFKIA Truck Freight Ferry | Not Viable | |

Pedestrian and Bicycle Issues

Issues and concerns relating to pedestrian and bicycle mobility and safety were raised by the public and by members of the study's Local Circulation / Parking / Bicycle & Pedestrian Subcommittee. Non-motorized transportation modes cannot be easily modeled and their benefits cannot be easily quantified. However, these modes represent important components of the transportation system and provide for increased mobility to Southern Brooklyn's residents and employees. The recommendations of the subcommittee for improving mobility and safety for non-motorized modes are summarized in Figure 9 and the following sections. Implementation of the recommendations would meet study objectives to encourage non-motorized travel, to encourage the shift from single-occupant vehicles to more efficient modes of transportation such as bicycling and walking, and to improve pedestrian safety.

BICYCLE AND PEDESTRIAN IMPROVEMENTS

Pedestrian Access to Transit

There is a need for safer conditions for pedestrians near bus stops and subway stations. Based on a review of pedestrian accidents near study area subway stations, the following stations should be considered priority locations for improvement:

- Church Avenue on the Q Line
- Canarsie on the L line
- Bay Parkway on the M, D Lines
- Church Avenue on the 2, 5 Lines
- 86th Street on the R Line

The issue of subway access is being addressed by the joint NYCDOT/NYCDOP Subway/Sidewalk Interface project at two subway stations within the study area on the Brighton Line – the Sheepshead Bay and Kings Highway stations. The study should be expanded to include additional Southern Brooklyn subway stations and to include major bus stops, reflecting much of the area's dependency on bus travel. Access to transit should consider wider sidewalks and medians, bus neckdowns under elevated stations, changes to street directions or curbside parking regulations, signal timing adjustments, lighting, streetscape enhancements, and improved wayfinding markers and signs.

Safety and Mobility for Pedestrians and Bicyclists On Major Arterials

Pedestrian and bicycle accidents are concentrated along Southern Brooklyn's arterial streets and major collectors. To reduce accident frequency, a number of measures could be employed. Where possible, signal progression could be used to manage the speed of traffic. Expanding the red light camera program on arterials would also address pedestrian safety, though it would require state authorizing legislation. Where excessive street width encourages speeding or presents a barrier to pedestrians, medians could be

FIGURE 9: BICYCLE & PEDESTRIAN RECOMMENDATIONS



considered. Other potential measures include turn prohibitions, neckdowns at intersections, and Leading Pedestrian Intervals following green traffic signals. Finally, streetscape improvements to areas of pedestrian concentration enhance pedestrian environment and signal to drivers that they are sharing the area with pedestrians.

Safety Issues Relating to Speeding and Through Traffic on Neighborhood Streets

At community meetings, concerns were expressed about speeding and through traffic in residential neighborhoods, especially in the vicinity of schools. The establishment of traffic calming programs and reviewing and updating Safe Routes to School programs in Southern Brooklyn neighborhoods could be investigated to address these concerns.

A first step would be to identify neighborhoods where traffic is a concern and traffic calming would be welcome. In those areas, one needs to apply a neighborhood-wide approach to reduce speeds and mitigate negative impacts of traffic and reduce spillover from street to street. Residents should participate in developing and evaluating their options to achieve consensus on benefits and trade offs.

The Safe Routes to School program applies a neighborhood traffic calming approach to improve the safety of the streets along walking routes to school. Schools may be prioritized for treatments depending on crash history, existing deficiencies and community concerns. Parents and teachers should participate in developing and evaluating options to achieve consensus on benefits and trade offs.

Truck Impacts on Residents Living on and off of Truck Routes

Southern Brooklyn residents living along or close to designated truck routes report elevated levels of noise, pollution, and vibration, and traffic safety concerns. Residents living on streets that are not designated by truck routes, but whose streets are routinely used by trucks as short cuts, share these concerns. This is a city-wide issue that the New York City Department of Transportation is currently studying in its *Truck Route Management and Community Impact Study*.

Bicycle Parking at Transit

Linking cycling and transit can improve the utility and accessibility of both modes, especially as much of Southern Brooklyn is too far from New York City's major employment centers for most potential cyclists. NYC Transit allows bicycles aboard subway cars as long as the cars are not too crowded. However, there appears to be a demand for secure bicycle parking at subway stations in Southern Brooklyn. It is easier for many cyclists to ride to the station and park than it is to bring bikes on a crowded subway train. Bicyclists are uncomfortable leaving their bikes unattended at transit stations because the bikes may be stolen.

This issue could be addressed by providing secure bicycle parking. The following locations for bicycle facilities were suggested at community and subcommittee meetings:

- Flatbush Avenue/Brooklyn College station on the 2, 5 Lines

- Sheepshead Bay station on the B, Q Lines
- Coney Island/Stillwell Avenue station on the D, F, N, Q Lines
- Bay Ridge Avenue on the R Line

Bicycle and Pedestrian Access to Shore Parkway Path and Other Recreational Facilities

Residents of many neighborhoods adjacent to the Shore Parkway have a hard time accessing the path and beaches by transit, foot or bicycle because conditions along the way are unsafe or inhospitable or because the access points are too far apart.

A possible solution to address these gaps and safety concerns would be to connect local streets in neighborhoods such as Canarsie, Bergen Beach and East New York to the Shore Parkway Greenway with short connector paths on Parkway land adjacent to inlets. On-street connections to the Shore Parkway Path could also be improved by addressing route and intersection safety for cyclists and pedestrians. These include areas where the following streets approach the greenway: Rockaway Parkway, Pennsylvania Avenue, Bay Parkway, Ocean Parkway south, Neptune Avenue and Flatbush Avenue.

Another issue is the inadequacy of on-street connections between the east and west segments of the Shore Parkway Path and between Ocean Parkway and Shore Parkway. A permanent off street or low traffic connector between the east and west segments of Shore Parkway Path could address this issue.

East-West Connections for Cyclists

There are some excellent on-street and off-street bicycle facilities in the study area. However, there is a deficit of east-west routes for cyclists in the middle of study area, and the eastern portion of study area is generally underserved by the bicycle network. A potential alternative is to upgrade existing recommended bicycle routes, such as the Farragut Road and Cozine Avenue corridors, by striping bike lanes or wide curb lanes. Additional bike routes in eastern portion of study area may need to be identified for possible inclusion in the NYC Cycling map and subsequent implementation.

Gaps in the Pedestrian and Bicycle Network

Southern Brooklyn has a number of excellent dual use recreation/transportation facilities. However, their utility is limited by their lack of connectivity. Large gaps exist between Southern Brooklyn's off-street bicycle and pedestrian networks, and transitions between paths and streets are confusing and can be dangerous.

Several major gaps were identified at community and subcommittee meetings. The east and west segments of Shore Parkway Path are disconnected from each other, the beaches and other recreational destinations. Ocean Parkway Paths are disconnected from Shore Parkway Path. Finally, there is no access for cyclists and pedestrians between Brooklyn and Staten Island. The Verrazano-Narrows Bridge lacks access for pedestrians and bicyclists.

A short term measure to address gaps is to improve wayfinding and pavement markings for bike routes, including wayfinding markers for major Southern Brooklyn destinations such as Keyspan Park, beaches, boardwalk and Brighton Beach shopping district. The NYC Department of Transportation has begun to improve pavement markings for Class III on-street bike routes. In the longer term, the gaps discussed above could be addressed as follows:

- Connect east and west segments of Shore Parkway Paths with upgraded facilities. Wherever possible, find off-street accommodation for pedestrians and bicyclists.
- Reconstruct the southern end of Ocean Parkway and minimize conflict with Shore Parkway ramps. [During the course of this study, this improvement was incorporated into the reconstruction of the Belt Parkway overpass at Ocean Parkway. The reconstruction was completed in November 2004.]
- Consider plans for bicycle and pedestrian access to and across the Verrazano-Narrows Bridge in future major rehabilitation work.