

# Introduction to BUS RAPID TRANSIT PHASE II



New York City Transit



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## EXECUTIVE SUMMARY

Two opposing forces are currently pulling at New York City transit riders and the transit system itself. On one hand, the transit system is in the midst of its worst financial crisis in nearly three decades. Riders are facing a large fare increase and deep cuts in bus and subway services. At the same time, buses and subways are overflowing with passengers—ridership is at levels not seen since the 1950's.

These financial and service challenges are closely inter-related, particularly in the case of bus service. Bus speeds, already among the slowest in the nation, continue to worsen, partly because of rising traffic levels and partly because more time is required to board the growing number of bus customers. This trend threatens to drive up operating costs and makes buses less attractive to riders.

This situation is not financially sustainable, nor is it sustainable from the perspective of passengers, our environment, and New York City's future transportation needs. After years of growth in bus ridership, slower speeds have begun to dampen passenger demand. Bus ridership leveled off even before the recession began to affect both bus and subway ridership. Moreover, the city's future growth cannot be served in an environmentally sustainable fashion—the core goal of PlaNYC, the City's long-term sustainability plan—without a robust and attractive mass transit system.

Thus, despite—and in some ways because of—the transit system's current financial straits, improvements to the quality and reach of the transit system are of vital importance. To be achievable given the transit system's fiscal constraints, service improvements need to be affordable and cost-effective. To meet the needs of riders, they must be delivered as quickly as possible.

Given the time and money required for subway system expansion, the opportunity for affordable, cost-effective, and timely improvements lies with improved bus service. The critical bus service needs are to make buses faster, more reliable, and more customer-friendly. These improvements can be delivered cost-effectively because they generate cost savings by improving bus speeds and attracting more customers.

### Bus Rapid Transit: Part of the Solution

Put together, the types of bus service improvements discussed above are known as bus rapid transit (BRT). BRT is a cost effective approach to transit service that cities around the world have used to make riding the bus more like riding the subway. BRT does this in two key ways:

#### IMPROVING SPEED AND RELIABILITY:

- **Frequent service:** on high-ridership BRT corridors buses arrive every five to 10 minutes or more frequently.
- **Station spacing:** BRT stops are spaced about every half a mile, reducing stop time.
- **Off-board fare payment:** Riders pay their fares at stations before boarding, reducing stop time.
- **Traffic Signal Priority (TSP):** BRT buses receive an extended green at traffic signals.
- **Bus lanes:** BRT buses operate in their own bus lane or busway, bypassing congestion.

## IMPROVING CUSTOMER COMFORT AND CONVENIENCE:

- **Enhanced stations:** BRT stops include attractive shelters with seating and lighting.
- **Real time bus arrival information:** Displays at BRT stations tell passengers when the next bus will arrive.
- **BRT vehicles:** BRT buses are low-floor and have as many as three doors, making boarding faster and more convenient.
- **Branding:** BRT routes feature a unique brand, making them easily identifiable.

MTA New York City Transit (NYCT) and the New York City Department of Transportation (NYCDOT) have worked together to create a Phase I BRT program with five planned routes (see map on page 11). In June of 2008, the City and the MTA launched New York's first version of BRT, called the Bx12 Select Bus Service (SBS), on Fordham Road in the Bronx. The results have been striking: **Travel times have decreased almost 20% and ridership has increased by more than 5,000 passengers per day.** Based on this success, the City and the MTA have begun planning a comprehensive BRT network that will act as a third system, complementing and supplementing the existing bus and subway networks.

## New York City's Transit Needs: Potential BRT Corridors

This report examines four types of unmet transit needs that may present opportunities for BRT: (1) high-density neighborhoods that are beyond easy walking distance of the subway; (2) common transit trips that take more than 30 minutes at speeds of less than 8 miles per hour; (3) subway lines that experience severe crowding during rush hour; and (4) neighborhoods experiencing growth that currently have limited rail access. Citywide, 31 unmet transit service needs were identified:

- **The Bronx:** four needs, including underserved areas in Soundview and along the Webster Avenue/Third Avenue corridor.
- **Brooklyn:** eight needs, including limited east-west transit options and underserved areas in the southeast section of the borough.
- **Manhattan:** six needs, including slow crosstown connections.
- **Queens:** nine needs, including underserved areas in the eastern section of the borough and a slow connection between Flushing and Jamaica.
- **Staten Island:** four needs, including a slow connection between the southern section of the borough and the nearest subway connections in Brooklyn.

Borough-by-borough maps of these needs are presented on pages 22-31.

## Making BRT More Rapid, Reliable, and Convenient

Looking to the future, NYCDOT and NYCT are exploring ways to improve upon the Fordham Road SBS features, including:

- **Advanced off-board fare payment:** Future systems may accept cash or credit cards and in the long term, the MTA may adopt a smart card system.
- **Advanced traffic signal priority:** Future systems may tie priority to schedule adherence or give buses a head start through particularly congested intersections.
- **Improved bus lanes:** NYCDOT is exploring a range of options, including offset bus lanes, which allow for easier curb access, and fully separated busways.
- **Real time bus arrival information:** Future stations may include displays that show passengers when the next bus is arriving.
- **BRT vehicles:** On the heaviest BRT routes NYCT may deploy three-door low-floor articulated buses.

## Moving Forward: Community Engagement

This report marks the start of an intensive community engagement process—detailed below—to explore the city’s transit challenges and possible BRT solutions. In May and June our two agencies will hold a series of public workshops across the city to discuss the findings of this report. Our agencies will also meet with elected officials, community board members, government partners, business

groups, community organizations, bus riders, and other key stakeholders. NYCT and NYCDOT will then select eight to 10 potential BRT corridors for further development. At the core of the planning effort for each corridor will be a community advisory committee. Our goal is simple: to develop BRT routes that benefit existing bus riders, provide an attractive option to potential new riders, and are sensitive to the needs of local residents and businesses.

## BRT Phase II: Community Process

### January - May 2009 Preliminary Outreach

- NYCT and NYCDOT meet with:**
- Community boards
  - Elected officials
  - Community groups
  - Business groups
  - Institutions (schools, hospitals, etc.)
  - Transit advocates
  - Other stakeholders

### May - June 2009 Public Workshops

- Participants will be able to:**
- Get information on BRT
  - Give feedback on the report
  - Discuss transit needs in their neighborhoods

### Summer 2009 Corridor Selection

- NYCT and NYCDOT will:**
- Consider transit needs and public feedback
  - Select 8-10 BRT corridors for further development
  - Release a final report

### Fall 2009 and thereafter Corridor Planning

- For each BRT corridor, NYCT and NYCDOT will:**
- Conduct stakeholder outreach
  - Create a community advisory committee
  - Hold a series of public workshops
  - Create a detailed BRT plan incorporating community input





## 1. INTRODUCTION

Each day, MTA New York City Transit carries more than 7.6 million passengers on its bus and subway systems—connecting workers to jobs, students to schools, and residents to shopping, recreation, and essential services. Transit ridership is at historically high levels in the New York: The number of daily subway trips is the highest level since 1950 and has increased more than 57% since 1990, while the number of daily bus trips has increased almost 60% in the same period. More than ever, New York's transit network is the lifeblood of the city and its economy.

But with the resurgence of the city and the transit system have come a new set of transportation challenges. Growth in ridership has led to significant crowding on the busiest parts of the subway network, like the Lexington Avenue line on Manhattan's East Side. Clusters of new jobs and housing have sprung up in neighborhoods, like Flushing in Queens, that have limited subway access and where residents have fewer transit choices and face longer rides than residents in areas better served by the subway. Traffic congestion has also worsened, bringing down bus speeds and making the bus system less attractive and more expensive to operate.

Transit ridership has increased almost 60% since 1990, leading to significant crowding on the busiest parts of New York's bus and subway systems.

At the same time projections indicate that the city will add nearly one million new residents and 750,000 new jobs by 2030. Expanded transit services are essential if the city is to continue to grow while reducing its carbon footprint—

New subways are not a feasible solution to most of the city's transit needs. As an alternative, BRT can be implemented in a shorter time frame and at a significantly lower cost.

the core goal of PlaNYC, the City's long-term sustainability plan. These challenges are emerging as the Metropolitan Transportation Authority (MTA) faces shortfalls in the billions of dollars in both its operating budget and upcoming five year capital program. Whatever course of action is taken by New York State to address the MTA's financial problems, there likely will be little funding available for subway expansion beyond what is already planned.

In the context of growing demand for transit and limited capital funding, how can the City and the MTA work together to meet the mobility needs of New Yorkers? Part of the solution is for the City and the MTA to improve New York's bus system by implementing bus rapid transit (BRT). Many people prefer the subway to the bus because it is faster, more reliable, and more convenient. BRT is a cost-effective approach that cities around the world have used to make riding the bus more like riding the subway. BRT combines a package of features, including off-board fare payment, bus lanes, traffic signal priority, enhanced stations, real-time bus arrival information, low-floor buses, and branding to improve bus performance.

MTA New York City Transit (NYCT) and the New York City Department of Transportation (NYCDOT) are moving forward with five Phase I BRT routes across the city—the result of a study launched in 2004. The first Phase I route, the Bx12 Select Bus Service (SBS), began service on Fordham Road in the Bronx in the summer of 2008. As discussed in more detail in the next chapter, the new service has dramatically reduced travel times and increased ridership.

Building on the Phase I program and the success of the Fordham Road pilot, NYCDOT and NYCT are further exploring how BRT can address underserved transit needs across New York City. Our goal is to create a comprehensive BRT network that acts as a third system, complement-

ing and supplementing existing subway and bus services. This report outlines more than 30 transit needs across the five boroughs that may be candidates for BRT and is the start of an intensive community engagement process to explore the city's transit challenges and possible BRT solutions. Out of this process our agencies will select eight to 10 corridors this summer for detailed BRT planning in partnership with local communities.

BX12

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Fordham  
Eyes



## 2. BUS SERVICE AND BRT: THE NEW YORK CITY CONTEXT

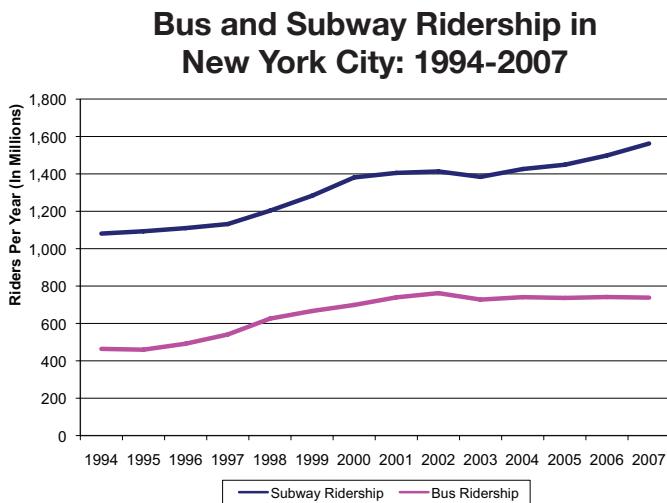
Bus service in New York City improved significantly over the past 25 years as the MTA purchased new buses, increased service frequency, and expanded service coverage. To improve bus speeds, the City has installed more than 50 lane miles of bus lanes and the MTA has introduced more than 40 limited stop bus routes. Riders have responded: Today the MTA carries more than 2.7 million bus passengers on an average weekday.

### The Challenge: Slowing Bus Speeds

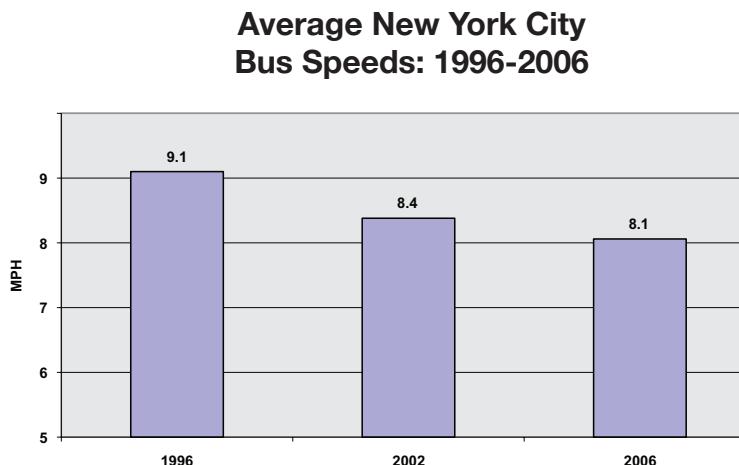
Progress in improving the bus system is being put at risk by persistent traffic congestion and slowing bus speeds. Bus ridership has leveled off in recent years, while subway ridership has continued to climb. Part of the reason is that bus service in New York is slow and getting slower. An analysis of bus speeds in New York reveals that:

- **New York has among the slowest buses in the country:** New York's buses are slower than those in other large cities like Boston, Chicago, and Washington, D.C.
- **Some bus trips are only marginally faster than walking:** During rush hour on some busy routes average bus speeds are four to five miles per hour.
- **Bus speeds continue to drop:** Between 1996 and 2006 bus speeds fell by 11%. The average speed is now 8.1 miles per hour, about half the speed of a local subway train.

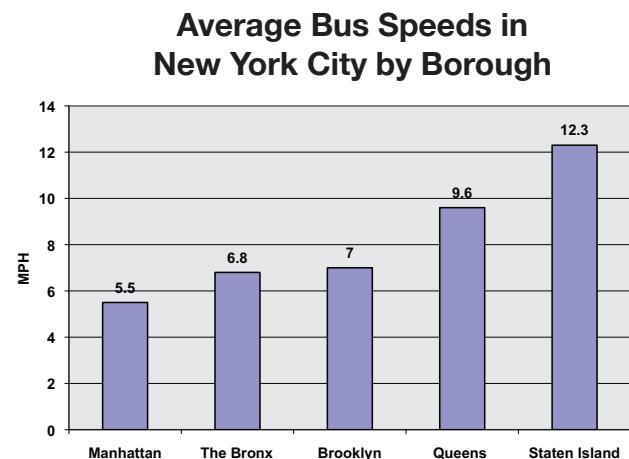
During rush hour, average bus speed on the M14 route on Manhattan's 14th Street is four to five miles per hour, barely faster than the average pedestrian.



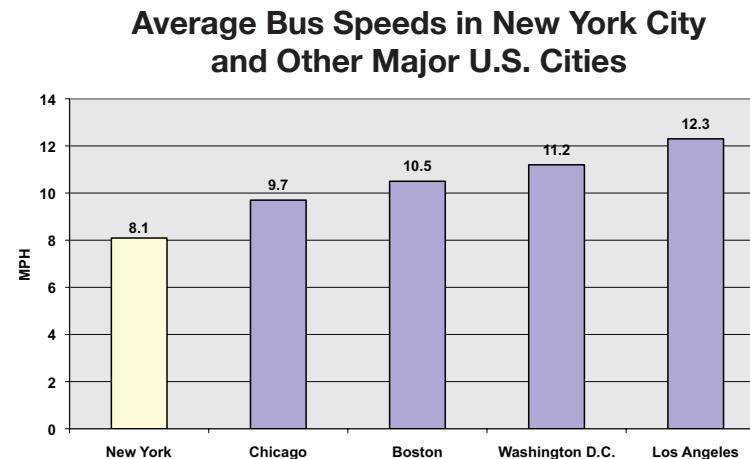
Source: MTA New York City Transit



Source: MTA New York City Transit



Source: MTA New York City Transit, 2006



Source: Federal Transit Administration National Transit Database, 2004

## Who are Bus Riders?

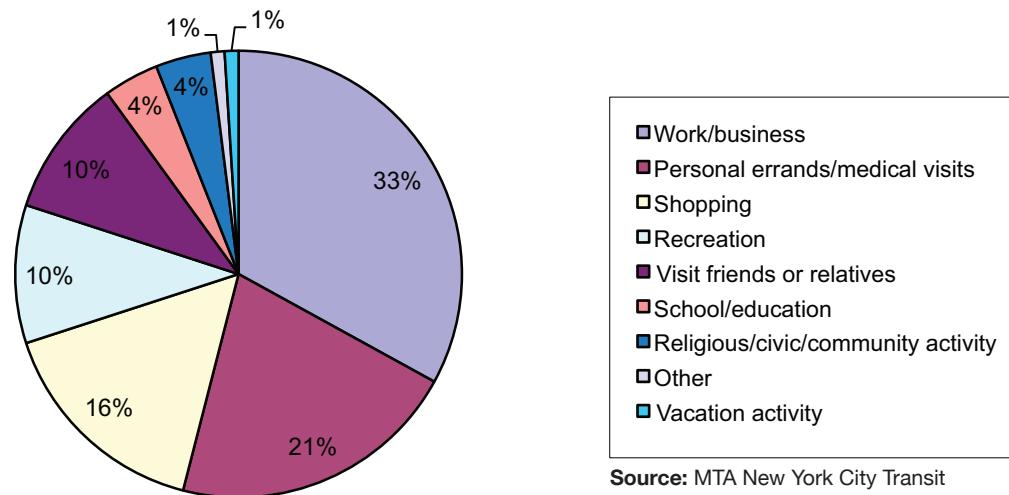
The decline in bus speeds has adverse economic and quality-of-life impacts on the millions of New Yorkers who depend on buses to get around. The bus system is an integral part of the city's transportation system:

- **Most New Yorkers ride the bus regularly:** More than half of all adult New Yorkers use the bus system at least once a week.
- **Many New Yorkers use the bus to get to their jobs:** About 14 percent of employed New Yorkers use the bus system to get to work.
- **Bus commuters have long travel times:** Roughly 80 percent of bus commuters spend more than 30 minutes getting to work.
- **Frequent bus riders are more likely to have low incomes:** Bus service is particularly vital to low-income New Yorkers, who are more likely to rely on the bus system.

As a result of low speeds and long travel times, customer satisfaction ratings for bus service are significantly lower than those for subway service.

Falling bus speeds also have implications for the cost of providing bus service. When service on a route slows, NYCT must deploy more buses and drivers to provide the same frequency of service. Slower speeds also lead to fewer passengers. This combination produces a self-reinforcing cycle of rising costs: slower buses increase operating costs, while decreasing ridership lowers fare box revenue.

**Trip Purposes for Adult Bus Riders**



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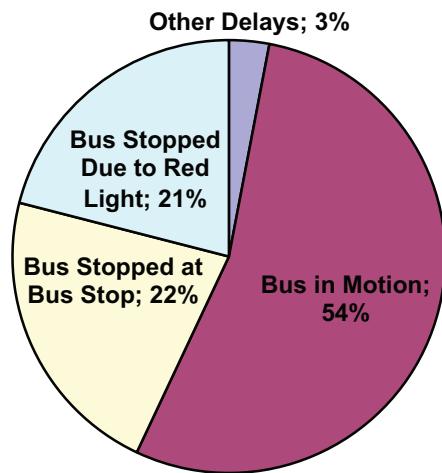
MODELUS

## BRT: A Subway on the Surface

Buses currently travel at about half the speed of local subway trains, and in the most congested areas of New York they can travel a quarter as fast. BRT makes buses faster, more reliable, and more convenient by incorporating features now found on the subway. These features reduce the key sources of bus delay and increase customer comfort and convenience.

Buses currently spend half of their running time stopped at red lights or picking up and dropping off passengers.

**How a Bus Spends its Run Time**



Source: MTA New York City Transit

## SPEED AND RELIABILITY

Buses typically spend only half of the time moving—often at low speed. The other half is spent at bus stops, picking up and dropping off customers, and stopped at traffic lights (see chart bottom left: How a Bus Spends its Run Time). BRT employs features targeted to reduce these delays and to improve reliability:

- **Frequent service:** On high ridership corridors BRT buses arrive every five to 10 minutes or more frequently.
- **Subway stop station spacing:** Like subway stops, BRT stops are spaced about every half a mile or more, so that buses spend less time stopping and starting.
- **Traffic Signal Priority (TSP):** BRT buses get an extended green light at intersections, reducing stop time at red lights.
- **Off-board fare payment:** Customers pay their fares at the BRT station, reducing the time required to pick up and drop off passengers.
- **Exclusive bus lanes:** BRT buses operate in bus lanes or physically-separated busways so that they can bypass traffic congestion.

## COMFORT AND CONVENIENCE

Besides making buses faster and more reliable, BRT seeks to improve the riding experience and to reduce the uncertainty typically associated with bus transit. These features include:

- **Enhanced stations:** Passengers wait at attractive shelters with seating, lighting, and passenger information displays.
- **Low-floor buses:** High ridership BRT corridors use three-door low-floor articulated buses, which are easier to board and exit.
- **Real time bus arrival information:** Displays at stations tell passengers when the next bus is arriving.
- **Branding:** BRT systems feature a unique brand, so BRT services can be easily identified by riders.



BRT Busway (Mexico City, Mexico)

Credit: The Institute for Transportation and Development Policy



Off-Board Fare Prepayment (York, Canada)



BRT Station (Brisbane, Australia)

Credit: The Institute for Transportation and Development Policy



Real Time Bus Arrival Display (Berlin, Germany)

## The New York City BRT Pilot Program

Starting in 2004 the City of New York, the MTA, and the New York State Department of Transportation conducted a joint study of BRT opportunities across New York City. The study focused on the city's highest volume bus routes and identified a set of five pilot corridors, shown on the Phase I BRT Program map on the next page.<sup>1</sup>

### PHASE I BRT PROJECTS

- 1 Fordham Road Bx12 SBS:**  
service launched June 2008
- 2 First Avenue/Second Avenue SBS:**  
service to begin in 2010
- 3 Nostrand Avenue SBS:**  
service to begin in 2011
- 4 34th Street Phase II SBS:**  
planning underway for an exclusive busway
- 5 Hylan Boulevard SBS:**  
planning underway for a revised project design

### OTHER BUS PRIORITY PROJECTS

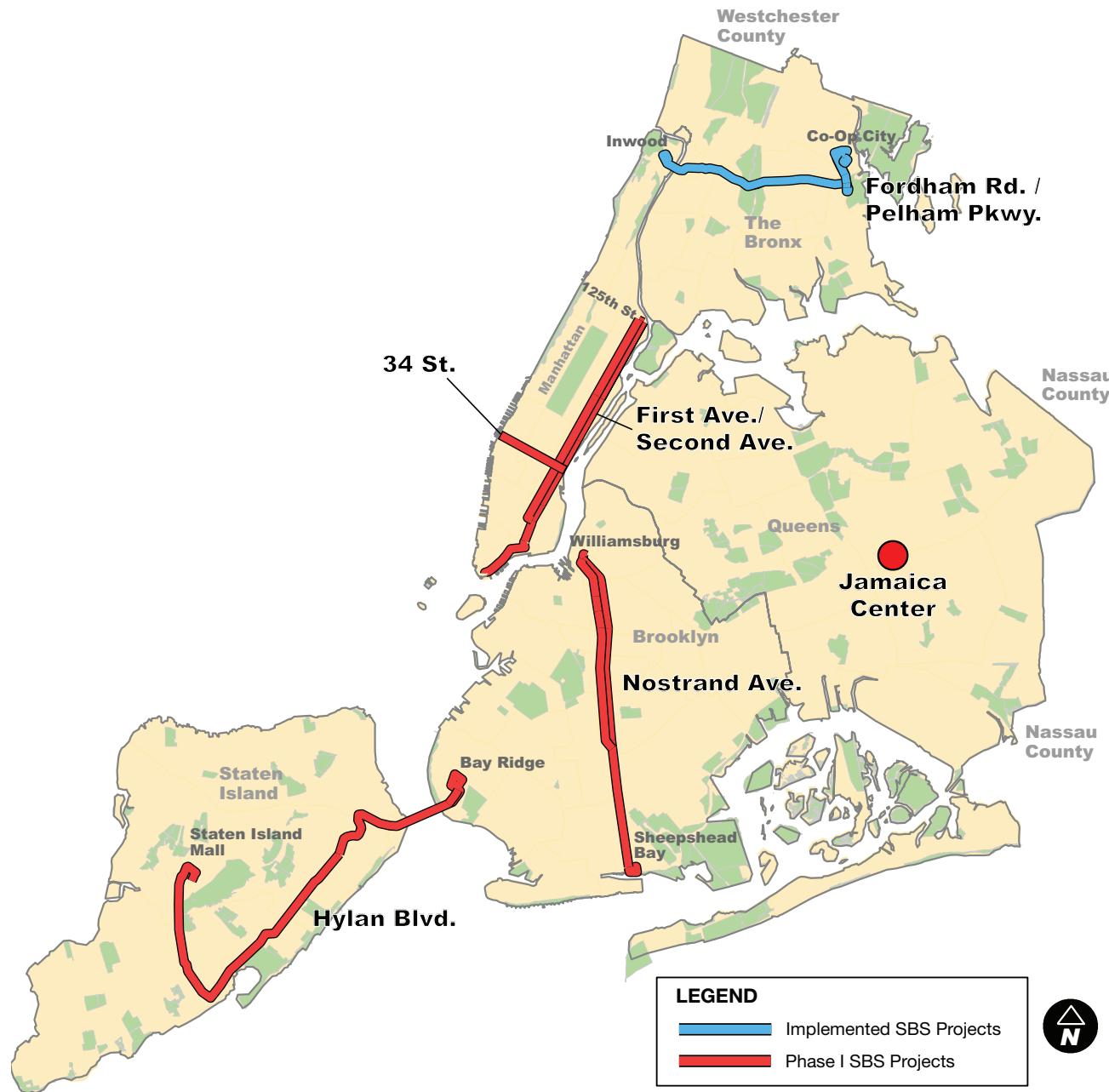
- 1 Fifth Avenue/Madison Avenue bus lane improvements:** completion in 2010
- 2 Downtown Jamaica Bus Improvements:**  
study completion in late 2009



Bx12 SBS

<sup>1</sup> The original study identified one route in each borough based on transit need, including existing ridership, and on BRT compatibility, including traffic conditions and the width of the right of way. The original set of corridors included Merrick Boulevard in Queens. After consultation with the community, NYCT and NYCDOT decided to refocus this effort on improving bus flow through downtown Jamaica, where buses are most often delayed by congestion. NYCDOT is now conducting a study of potential bus priority treatments in and around downtown Jamaica. Thirty-fourth Street was added to the BRT program in 2007.

## Phase I BRT Program



## The Bx12 Select Bus Service

The City implemented its first phase of BRT service, called Select Bus Service (SBS), on Fordham Road in the Bronx in June of 2008. The Bx12 SBS incorporates a range of features, as shown in the graphic on the next page, to improve speed, reliability, and passenger comfort. NYCT continues to operate the local service at a robust frequency.

### OFF-BOARD FARE PAYMENT: HOW IT WORKS

The fare for the Bx12 SBS is the same as the subway and local bus fare. The fare payment system works as follows:

- **Paying the fare:** Customers pay their fares at machines located at each station and are issued a receipt. The machines accept MetroCards and coins.
- **Boarding:** When the bus arrives, customers can enter through the front or the rear door without swiping their MetroCard, just as they would when boarding a subway car.
- **Enforcement:** Fare inspectors patrol the route and conduct random ticket checks; passengers who do not have a receipt are subject to a \$100 summons.

### SERVICE IMPROVEMENTS

The results of the pilot have been striking:

- **Decreased travel time:** Running time has been reduced by 19%, or 11 minutes from end-to-end.
- **Increased ridership:** Ridership on Fordham Road, including both the Bx12 SBS and Bx12 local, has increased by more than 11%, or 5,000 passengers per day.
- **High customer satisfaction:** Ninety-eight percent of Bx12 SBS riders say they are satisfied or very satisfied with the new service.
- **Low fare evasion:** Despite the introduction of off-board fare payment, the fare evasion rate has declined to three percent.

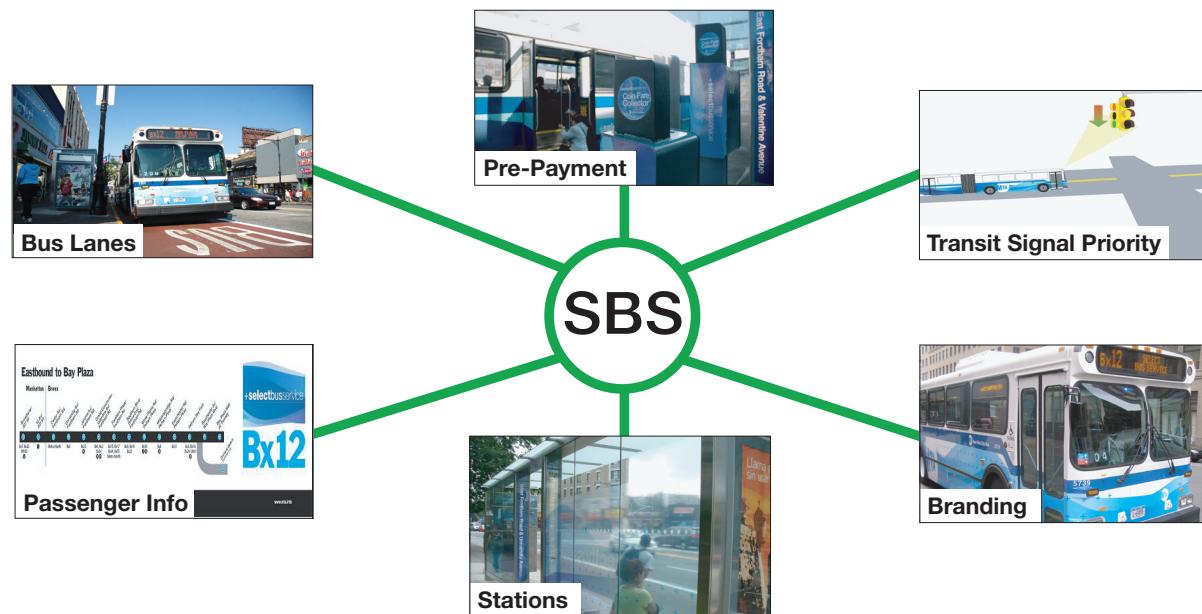
Running time on the Bx12 SBS has been reduced by 19% and customers have responded—weekday ridership has increased over 11%, or 5,000 daily passengers.

### COMMUNITY ENGAGEMENT

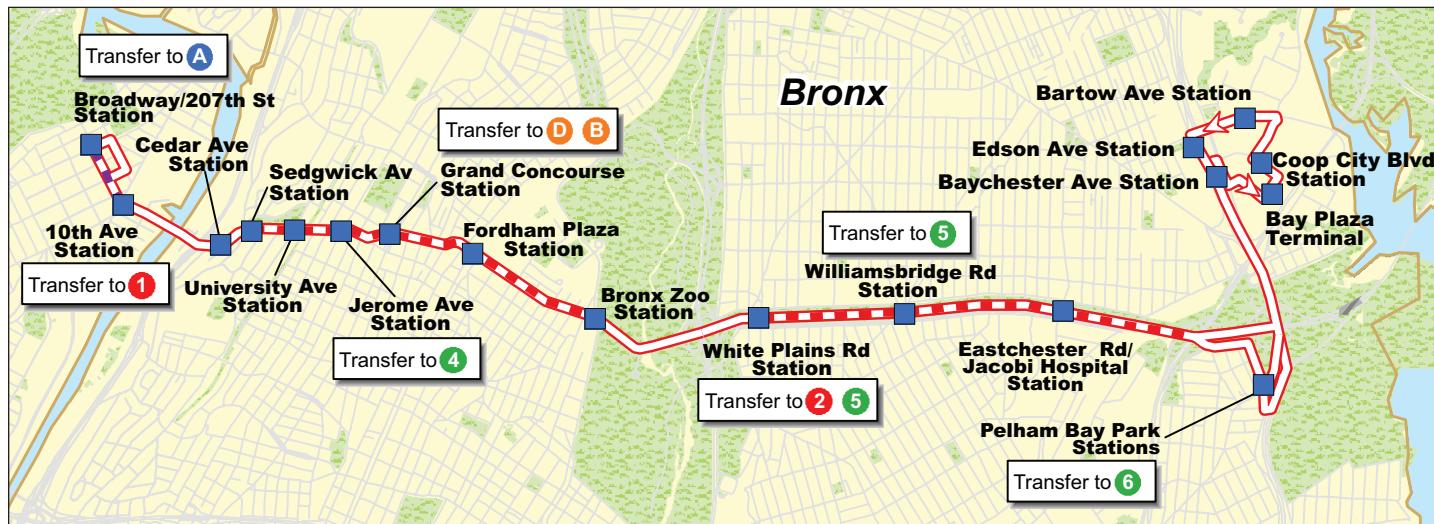
The Fordham Road pilot has also illustrated one of BRT's other advantages: flexibility. NYCDOT and NYCT have worked with local leaders and businesses to address a range of community concerns:

- **Truck loading:** NYCDOT created two-hour delivery zones in the bus lanes for businesses in the Fordham Road shopping district.
- **Metered parking:** NYCDOT added metered parking on side streets in the Belmont section to replace parking restricted due to the bus lane.
- **New SBS stations:** NYCT and NYCDOT added SBS stations at Sedgwick Avenue and Bartow Avenue.
- **Improved pedestrian access:** NYCDOT and the New York City Department of Parks and Recreation built new sidewalks at stations along Pelham Parkway.

## Select Bus Service Package of Features



## Fordham Road Select Bus Service



### 3. AN ASSESSMENT OF NEW YORK CITY'S TRANSIT SERVICE NEEDS

While the subway provides fast and convenient service to much of New York City, BRT can help to better serve neighborhoods and jobs centers beyond the reach of the subway network and to improve trip times on heavily traveled bus routes. NYCT and NYCDOT identified four sets of unmet service needs that BRT might address. (See Appendix A: Service Needs Assessment Methodology for a full description of the study approach.)

#### Underserved Neighborhoods

Residents who do not have easy access to the subway—the backbone of New York's transit network—often face long trips, transfers from one bus route to another or to the subway, and unpredictable trip times if they choose transit.

- **Phase I BRT Routes:** The planned Nostrand Avenue SBS route will provide better service to the underserved area extending from East Flatbush to Sheepshead Bay in Brooklyn.
- **Potential BRT Corridors:** NYCT and NYCDOT identified nine city neighborhoods that are beyond easy walking distance of the subway and that have sufficient residential density to support high-frequency BRT service. See the Underserved Neighborhoods map on the next page.

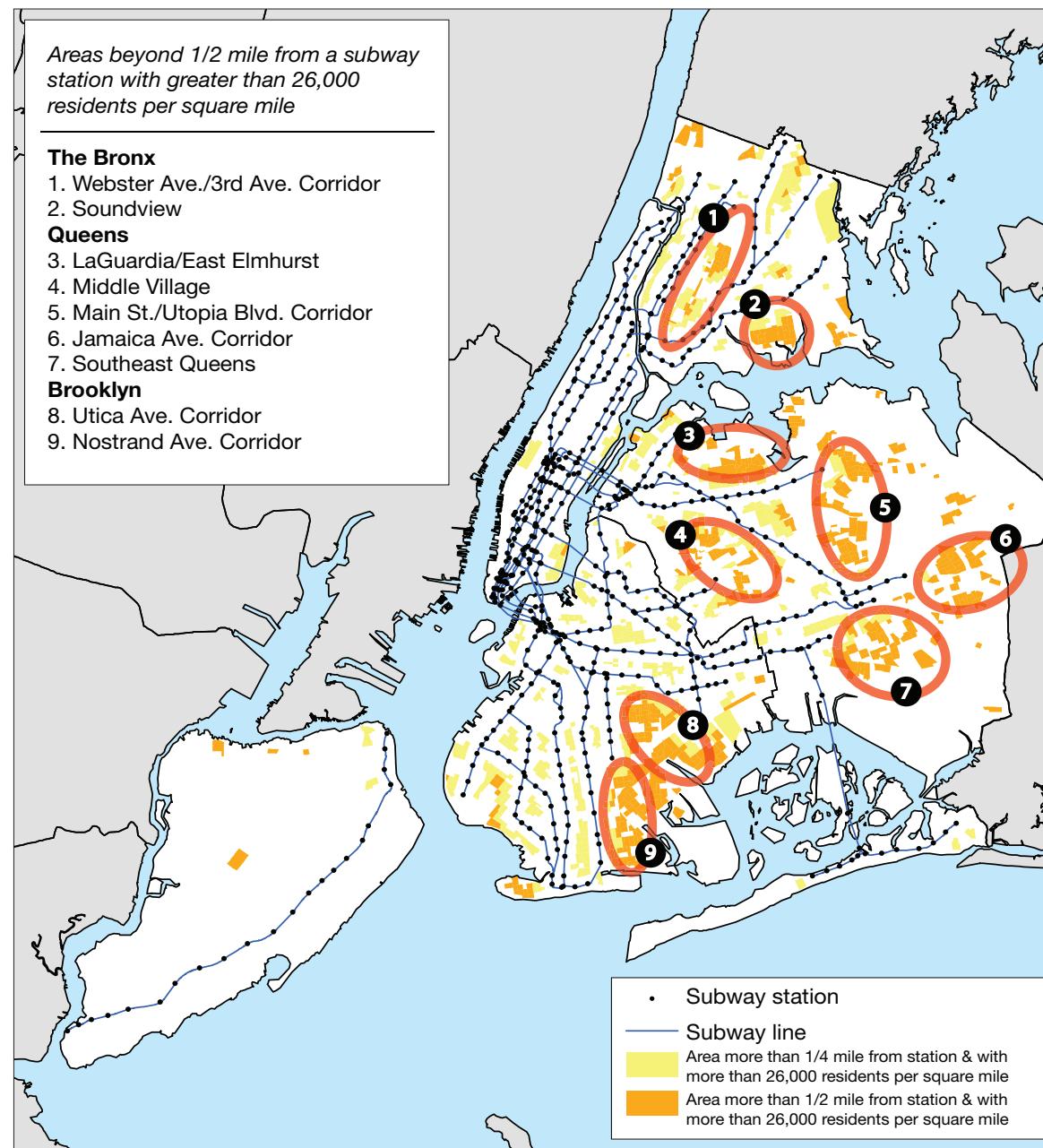
#### Express Bus Needs

In addition, NYCT and NYCDOT identified five highway corridors that carry high volumes of express buses and that could benefit from enhanced bus priority, such as a dedicated bus lane. These express bus routes serve many of the underserved areas identified and provide a convenient one-seat ride to Manhattan. The two agencies are also taking steps to speed express bus service through the Manhattan central business district.



High Volume Express Bus Corridors

## Underserved Neighborhoods



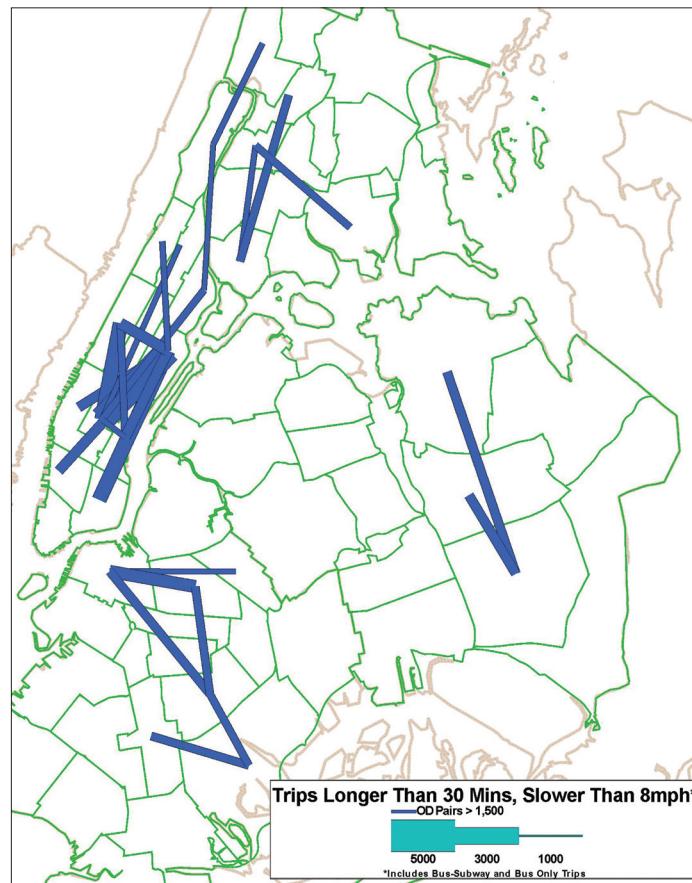
## Difficult Trips

Many New Yorkers make transit trips that are not well served by the hub-and-spoke route structure of the city's subway system. Such trips often take longer, require transfers between buses or bus and subway, and have less predictable travel times.

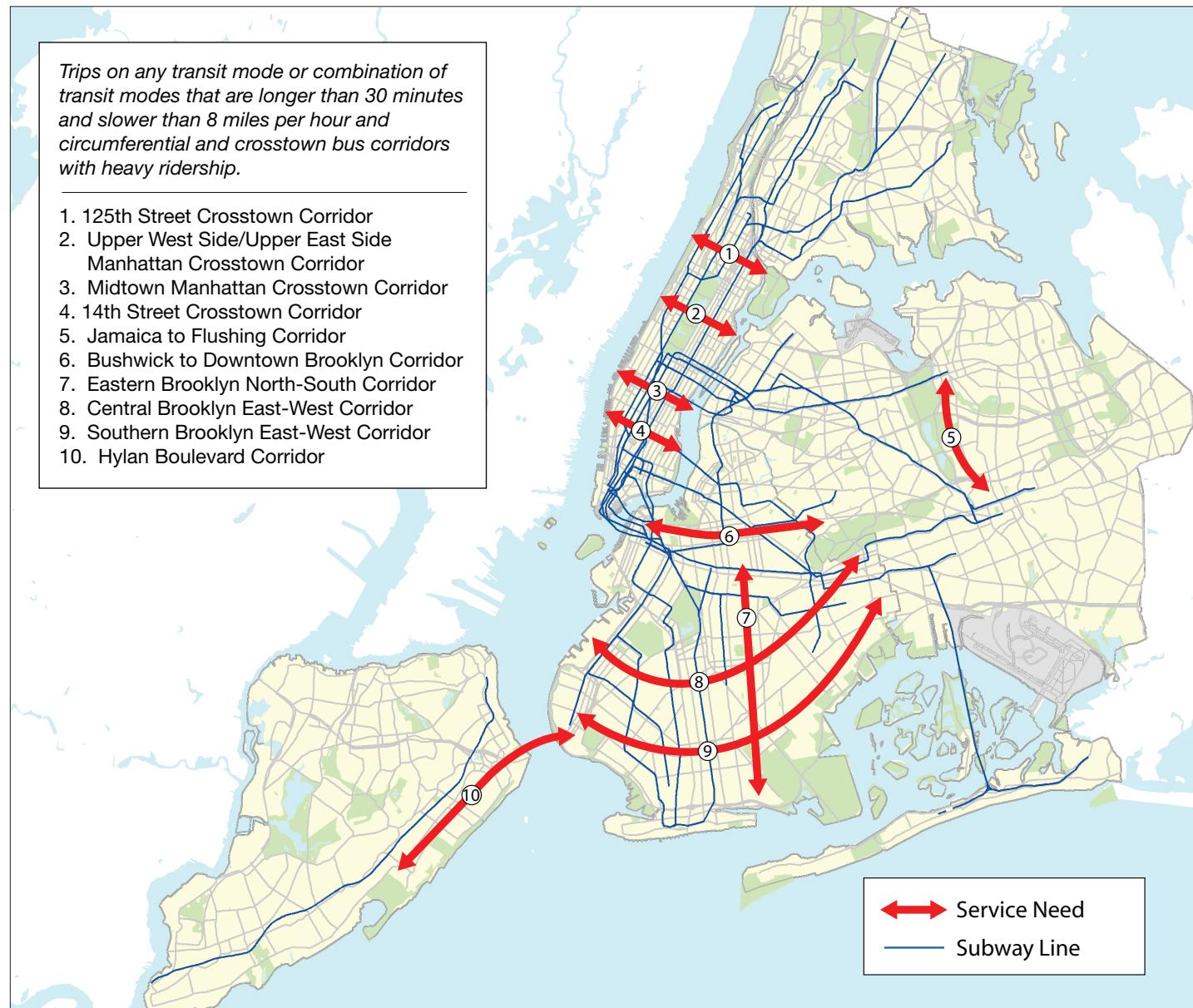
- **Phase I BRT Routes:** The planned 34th Street SBS route will help to address the difficulty of making crosstown trips in Midtown Manhattan.
- **Potential BRT Corridors:** NYCT and NYCDOT identified clusters of trips that take more than 30 minutes at speeds of less than eight miles per hour. The Long and Slow Trips map on the right schematically shows these trips: the wider a given line, the more travelers making that trip. The Difficult Trips map on the next page presents these needs, as well as crosstown and circumferential trips not served by the subway.

A trip from Jamaica Center to Midtown takes 28 minutes on the **E** train, but a trip half the distance from Jamaica Center to Flushing takes more than 40 minutes on the bus.

## Long and Slow Trips



## Difficult Trips



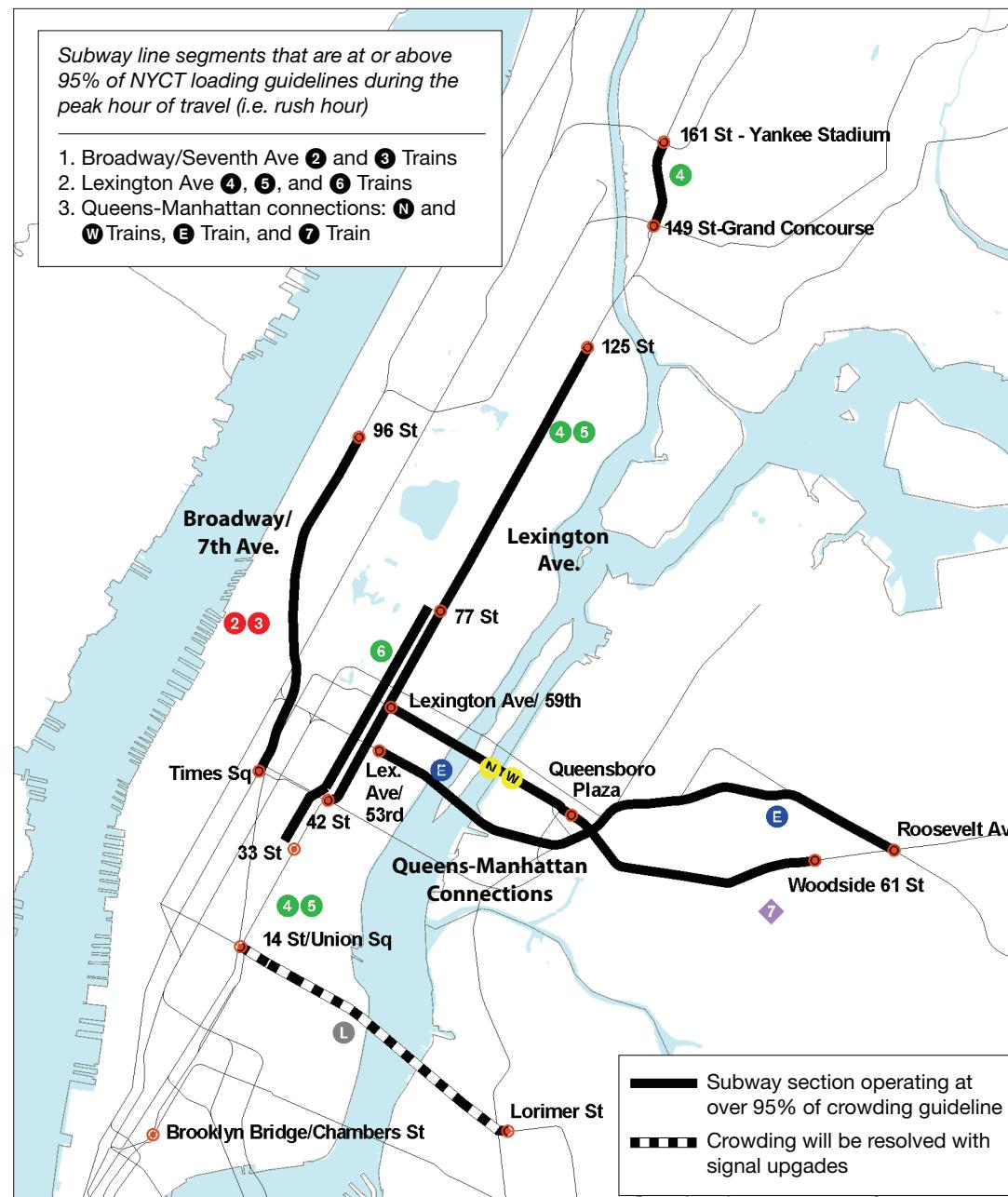
## Subway Crowding

Despite increases in service over the past 15 years, several subway lines now experience severe crowding during the morning and evening rush hours.

- **Phase I BRT Routes:** The Second Avenue Subway and planned First Avenue/Second Avenue SBS Route will provide relief to Manhattan's East Side.
- **Potential BRT Corridors:** The Subway Crowding map on the next page shows subway line segments that operate at or above 95% of NYCT's subway loading standards.

On average, the Lexington Avenue **4** and **5** trains operate at 106% of capacity during the morning rush hour.

## Subway Crowding



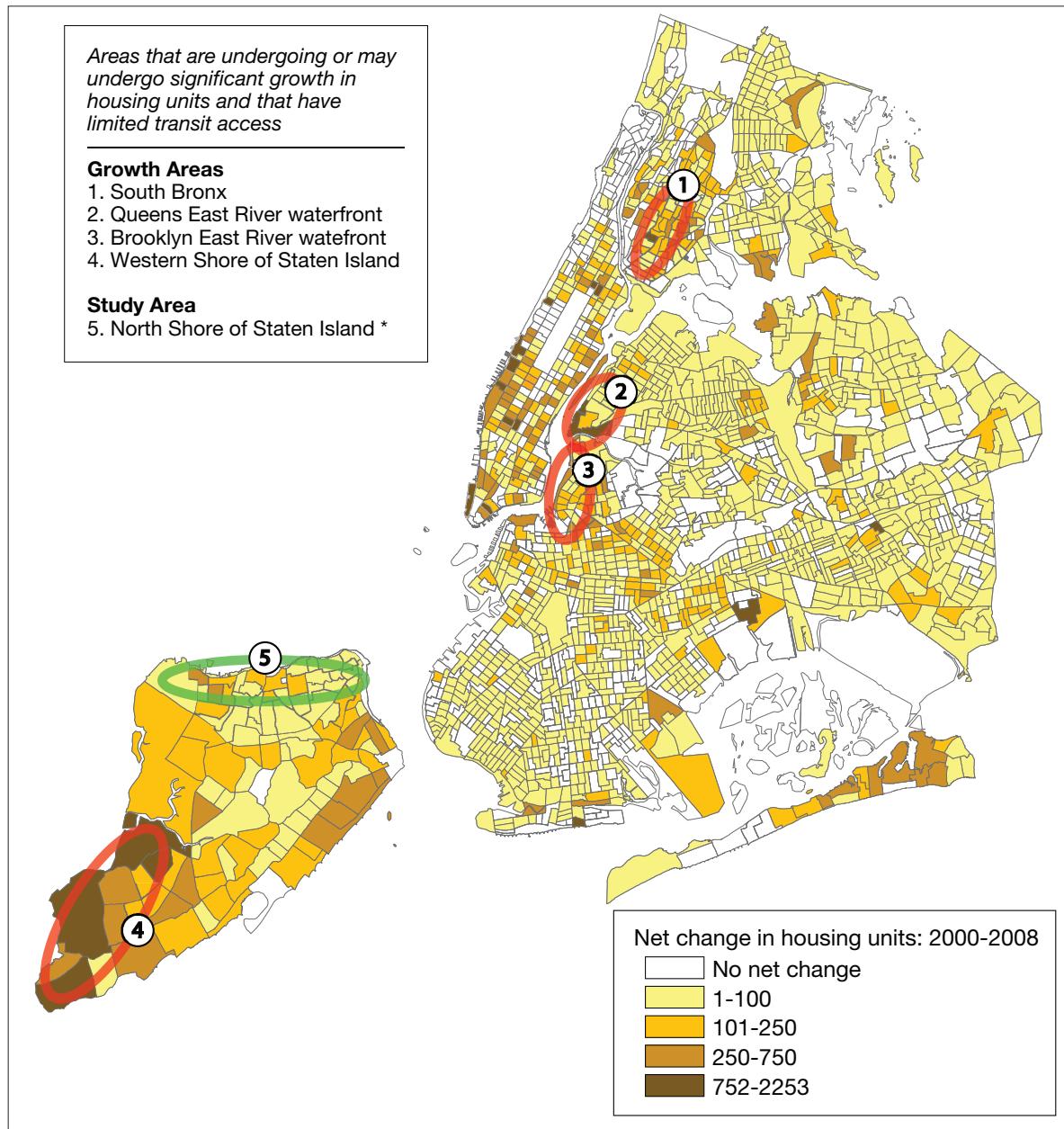
## Growth Areas

Most areas experiencing significant residential development are served by the subway, but some development is occurring or may occur in areas with more limited transit access.

- **Potential BRT Corridors:** The study team focused on areas experiencing or under study for growth that currently have limited rail access, as shown in the Growth Areas map on the next page.

BRT could connect high-rise development on the Brooklyn and Queens East River waterfront to subways and expanded ferry service.

## Growth Areas



\* The NYC Economic Development Corporation is pursuing a land use study in coordination with an MTA transit options study for Staten Island's North Shore.

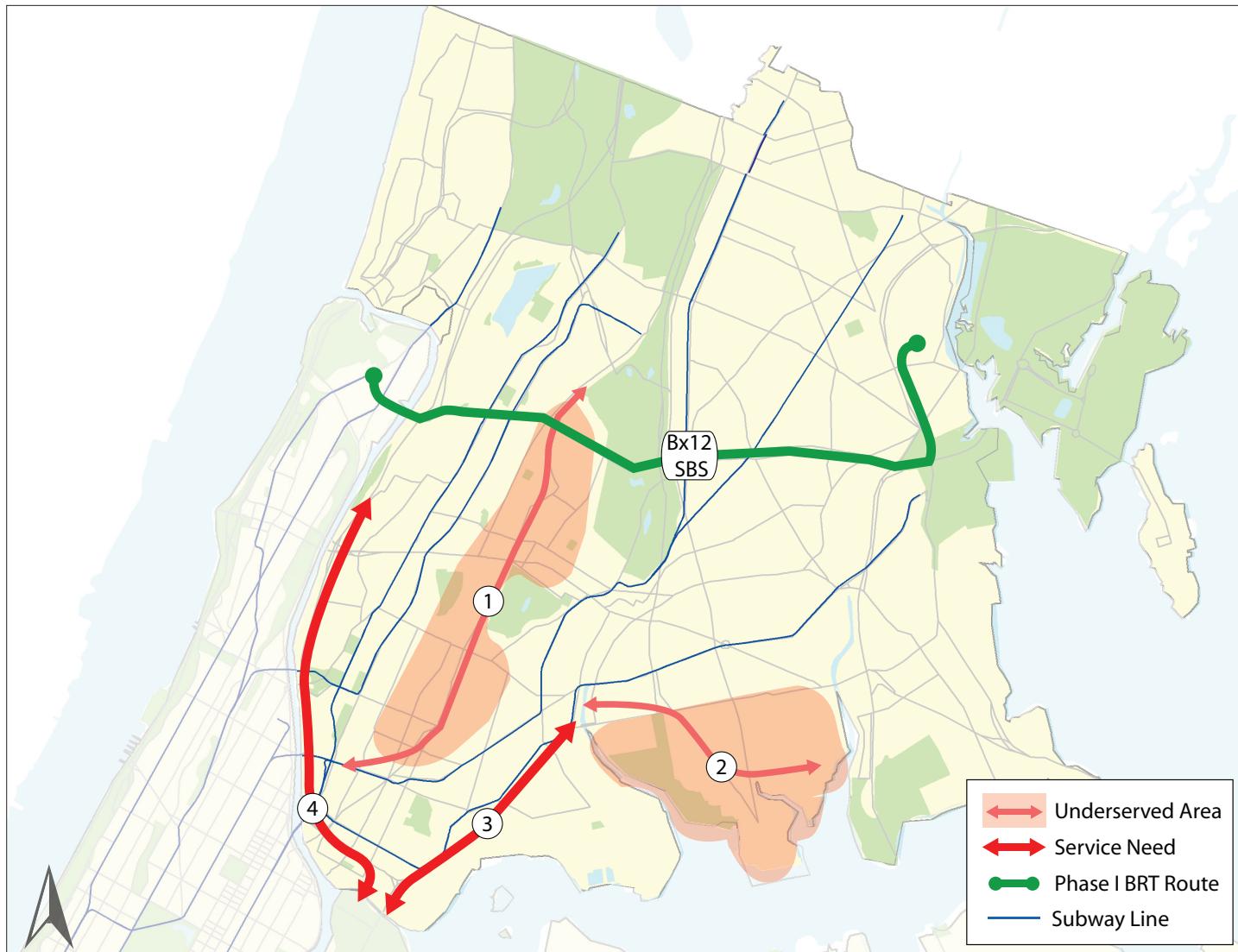
**Borough Profiles:** The maps on the following pages show these needs for each borough.

## The Bronx

Phase I BRT Routes		
Route	Need Type	Status
Bx12 SBS	Difficult Trip	Corridor links 8 subway lines: <b>1 2 4 5 6 A B</b> and <b>D</b> trains; started operation in June 2008 and carries almost 50,000 trips a day (combined Bx12 SBS and Bx12 local)

Potential BRT Corridors			
	Corridor or Area	Need Type	Existing Conditions
<b>1</b>	Third Avenue and Webster Avenue Corridor	Underserved Area	Existing bus services on the corridor carry a combined 69,000 trips a day
<b>2</b>	Soundview	Underserved Area	Separated from subway service by the Bruckner Expressway
<b>3</b>	Bruckner Expressway	High Volume Express Bus Route	Carries 138 express buses with 13,000 passengers each weekday morning
<b>4</b>	Major Deegan Expressway	High Volume Express Bus Route	Carries 38 express buses with 5,000 passengers each weekday morning

## Bronx Phase I BRT Routes and Potential BRT Corridors

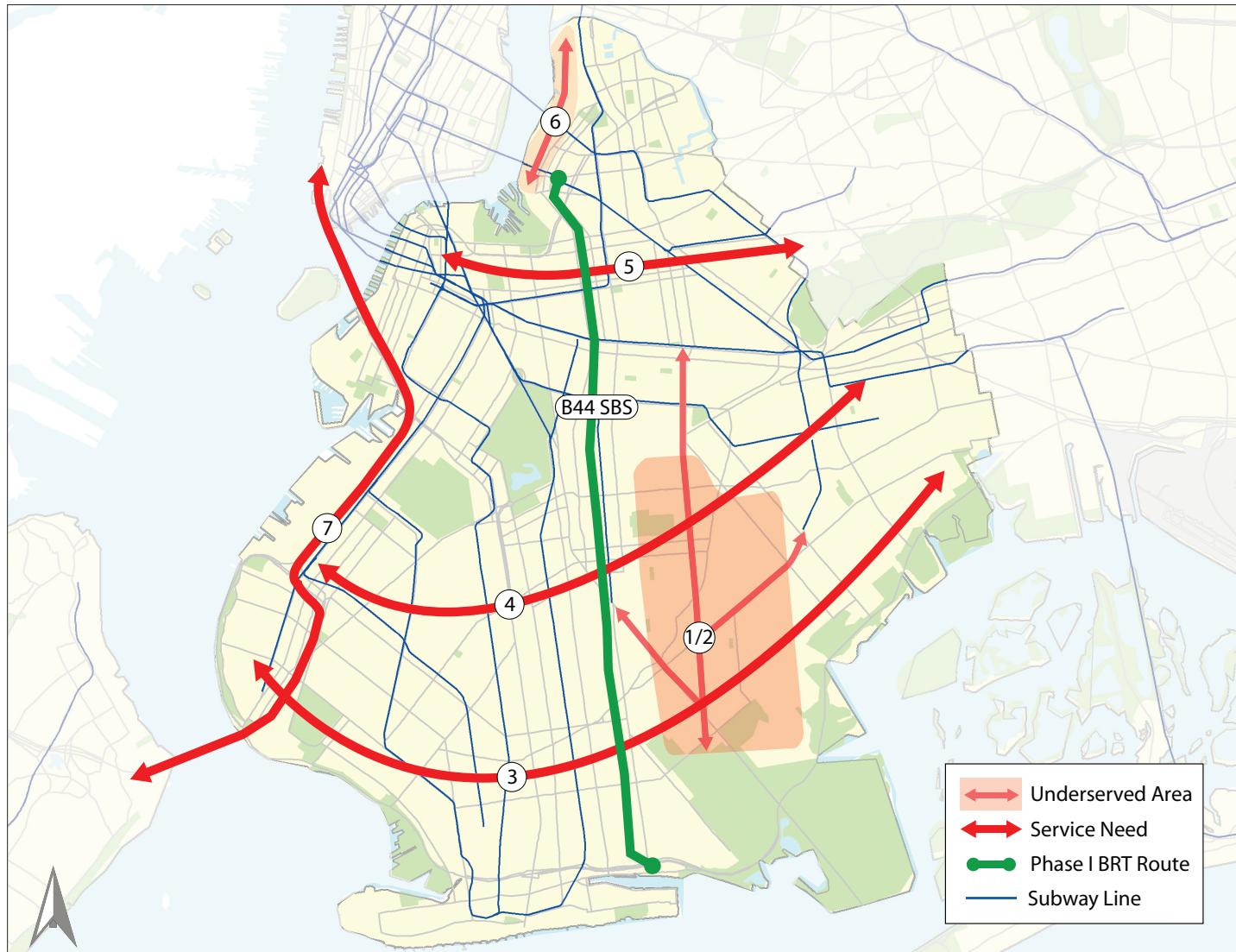


## Brooklyn

Phase I BRT Routes		
Route	Need Type	Status
Nostrand Avenue SBS	Underserved Area	Existing B44 bus service carries 44,000 trips a day; new service planned for 2011

Potential BRT Corridors			
	Corridor or Area	Need Type	Existing Conditions
1	Utica Avenue corridor	Underserved Area	Existing B46 bus service carries 52,000 trips a day
2	Eastern Brooklyn: North-South Corridor	Difficult Trip	Existing bus routes that run on all or part of the corridor carry a combined 143,000 trips of day, of which 14,000 are long and slow
3	Southern Brooklyn: East-West Corridor	Difficult Trip	Corridor links 7 subway lines; existing bus routes that run on all or part of the corridor carry a combined 107,000 trips a day, of which 8,500 are long and slow
4	Central Brooklyn: East-West Corridor	Difficult Trip	Corridor links 9 subway lines; existing bus routes that run on all or part of the corridor carry a combined 62,000 trips a day, of which 7,000 are long and slow
5	Bushwick to Downtown Brooklyn	Difficult Trip	Existing bus routes that run on all or part of the corridor carry a combined 56,000 trips a day, of which 4,000 are long and slow
6	Williamsburg: East River Waterfront	Growth Area	Significant residential development since 2000
7	Gowanus Expressway	High Volume Express Bus Route	Carries 539 express buses with 44,000 passengers each weekday morning

## Brooklyn Phase I BRT Routes and Potential BRT Corridors

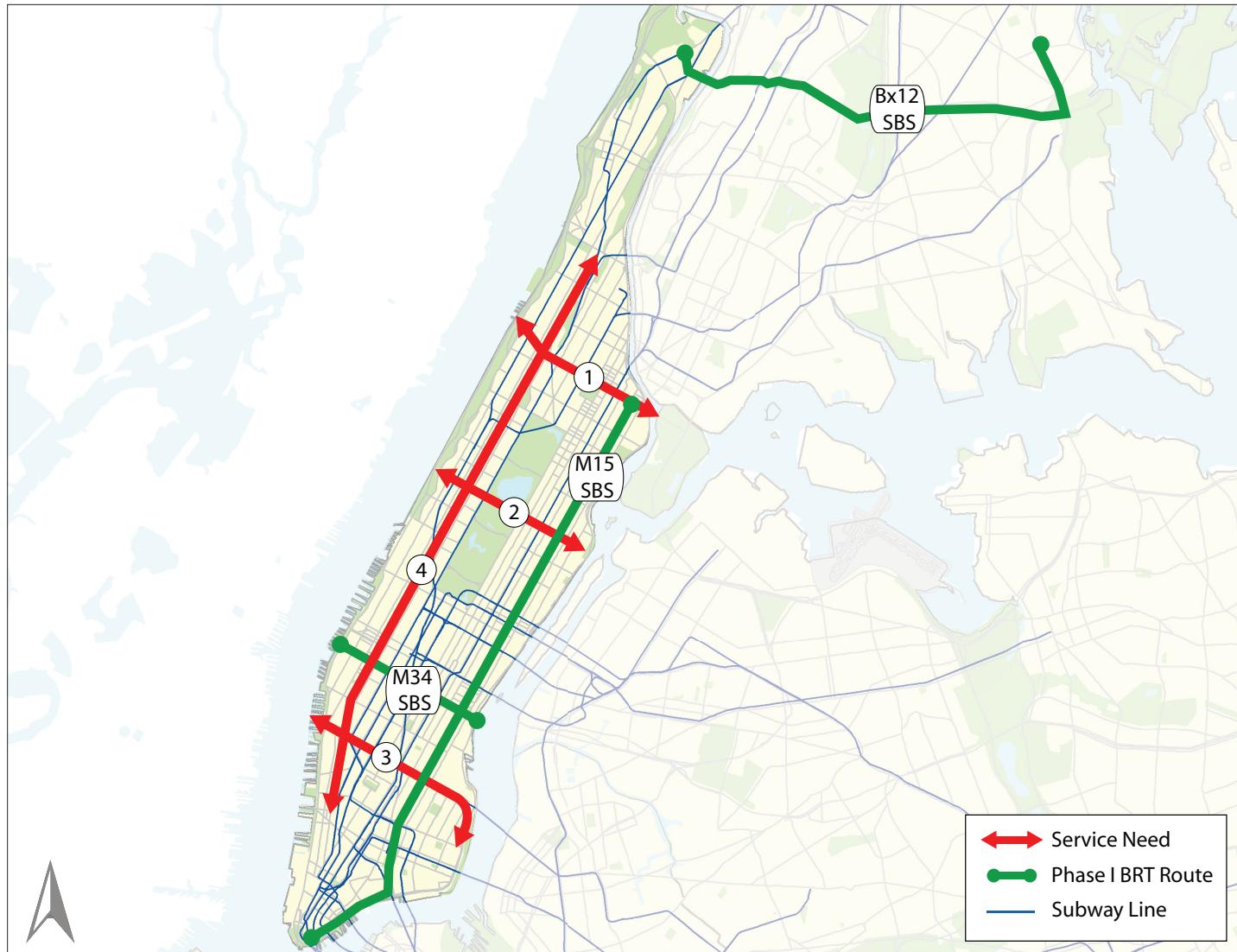


## Manhattan

Phase I BRT Routes		
Route	Need Type	Status
First Avenue/ Second Avenue SBS	Subway Crowding	Will help relieve subway crowding on the Lexington Avenue lines ( <b>4</b> <b>5</b> <b>6</b> ); planned for 2010
34 Street Phase II SBS	Difficult Trip	Links 15 subway lines, the PATH to New Jersey, and Penn Station commuter rail; in planning

Potential BRT Corridors			
	Corridor or Area	Need Type	Existing Conditions
<b>1</b>	125th Street Crosstown Corridor	Difficult Trip	Corridor links 10 subway lines; existing bus services carry 64,000 trips a day
<b>2</b>	Upper West Side/Upper East Side Crosstown Corridor	Difficult Trip	Existing bus routes that run on all or part of the corridor carry a combined 80,000 trips a day, of which 13,000 are long and slow
<b>3</b>	14th Street Crosstown Corridor	Difficult Trip	Existing M14 bus route carries a 39,000 trips a day, of which 2,100 are long and slow
<b>4</b>	West Side Corridor	Subway Crowding	<b>2</b> and <b>3</b> trains on Broadway/Seventh Avenue operating at or above 95% capacity during rush hour

## Manhattan Phase I BRT Routes and Potential BRT Corridors

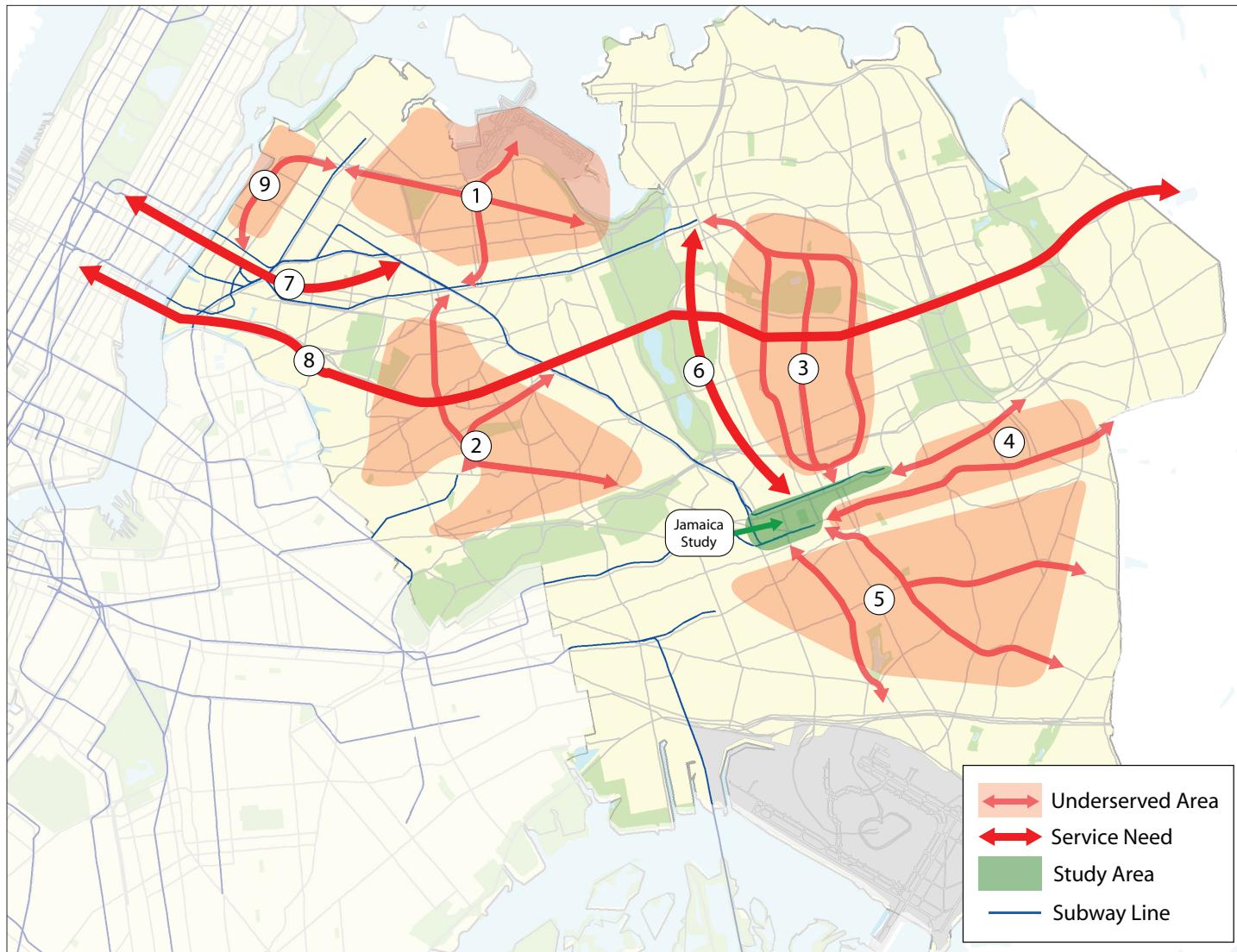


## Queens

Bus Improvements	
Action	Description
Jamaica Center bus study	Will examine ways to improve bus flow through Jamaica's congested downtown

Potential BRT Corridors			
	Corridor or Area	Need Type	Existing Conditions
1	LaGuardia Airport/ East Elmhurst	Underserved Area	Airport serves 60,000 passengers a day, is the only major NYC area airport without a rapid transit link
2	Middle Village	Underserved Area	Area beyond easy walking distance from the subway
3	Utopia/Fresh Meadows	Underserved Area	Area beyond easy walking distance from the subway
4	Jamaica Avenue/ Hillside Avenue Corridor	Underserved Area	Existing bus services carry 40,000 trips a day
5	Southeast Queens	Underserved Area	Area beyond easy walking distance from the subway
6	Jamaica to Flushing	Difficult Trip	Existing bus services carry 96,000 trips a day
7	Queens-Manhattan Connections	Subway Crowding	7, E, N, and W trains between Queens and Manhattan operating at or above 95% capacity during rush hour
8	Long Island Expressway	High Volume Express Bus Route	Carries 290 buses with 18,000 passengers each weekday morning
9	Long Island City East River Waterfront	Growth Area	Significant residential development since 2000

## Queens Bus Improvements and Potential BRT Corridors

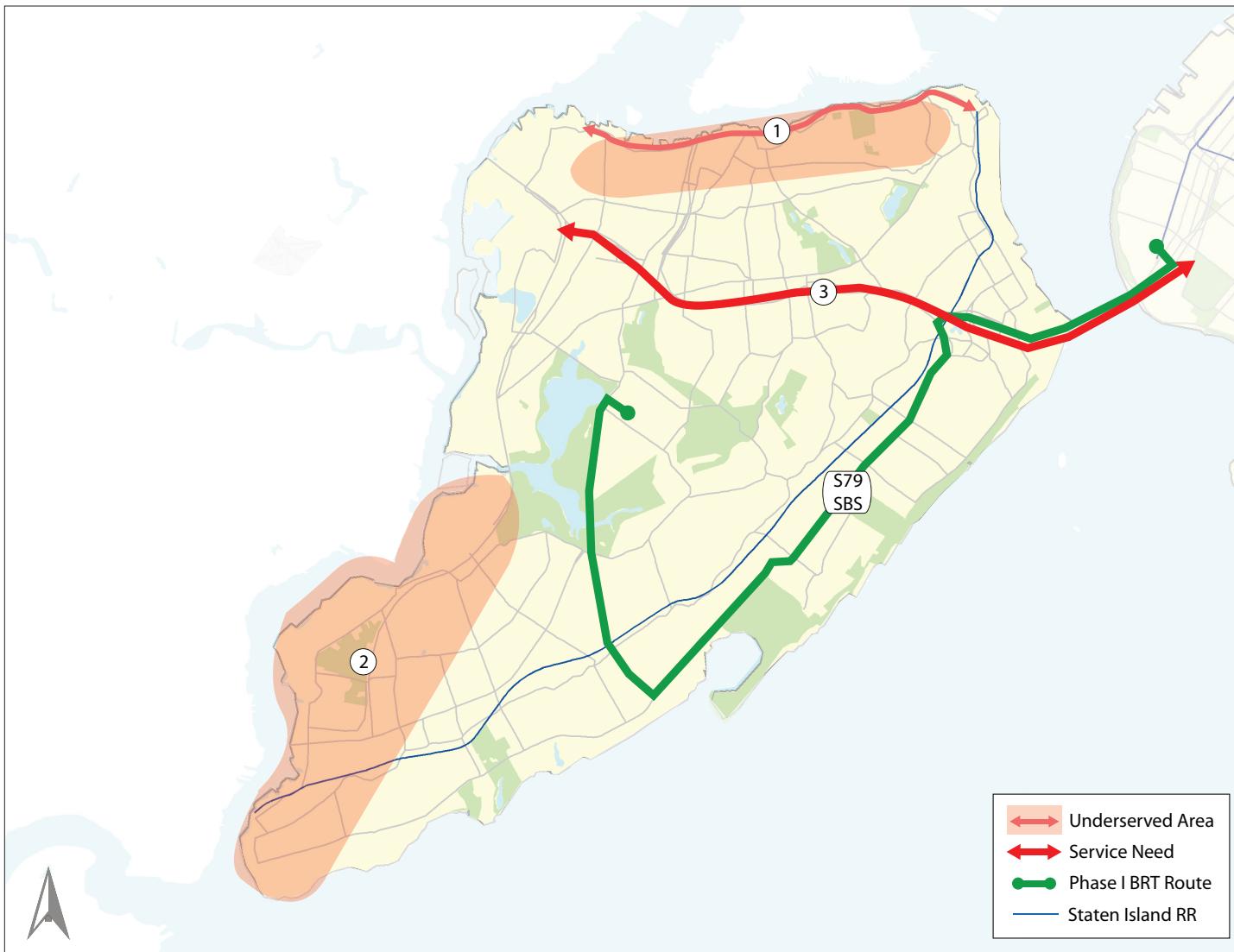


## Staten Island

Phase I BRT Routes		
Route	Need Type	Status
Hylan Boulevard SBS	Difficult trip	Faster connection from Staten Island's south shore to Brooklyn; in planning

Potential BRT Corridors			
	Corridor or Area	Need Type	Existing Conditions
1	North Shore	Study area	NYC Economic Development Corporation is pursuing a land use study in coordination with an MTA transit options study
2	West Shore	Growth area	Low density area; candidate for express bus improvements
3	The Staten Island Expressway	High volume express bus route	Carries 245 buses with 19,000 passengers each weekday morning

## Staten Island Bus Improvement and Potential BRT Corridors



## 4. MAKING BRT MORE RAPID, RELIABLE AND CONVENIENT

The Bx12 SBS on Fordham Road in the Bronx represents a successful beginning for BRT in New York City: travel times are down, ridership is up, and customer satisfaction is high. Looking to the future, NYCDOT and NYCT are developing improvements to the current suite of SBS features. For example, future routes may include real-time bus arrival displays at stations and three-door, low-floor articulated buses. This section will highlight efforts that NYCT and NYCDOT are undertaking to improve the features of future BRT services.

NYCT and NYCDOT are considering three-door, low-floor articulated buses, real-time passenger information displays at stations, and enhanced bus lanes for future BRT routes.



East Fordham Road & Valentine Avenue

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## Improving Speed and Reliability

Speed and Reliability: Summary of Potential Improvements		
Feature	Current Approach	Improvements Under Consideration
Transit Signal Priority	First generation TSP that provides priority to all buses	Next generation TSP with priority linked to schedule adherence
Off-Board Fare Payment	First generation fare machines that accept MetroCards and coins	Enhanced machines that may dispense MetroCards and accept credit cards and bills; longer term: smart cards
Bus Lanes	Curbside bus lanes	An array of bus priority options, including offset bus lanes and physically separated busways
Bus Lane Enforcement	NYPD officers issuing tickets	Enforcement through bus lane cameras, if approved by the New York State Legislature

### Transit Signal Priority (TSP)

#### TSP: HOW IT WORKS

An average bus spends nearly 25% of its time stopped at red lights. Transit Signal Priority (TSP) can help reduce this delay. TSP works as follows:

- **Priority request:** As a bus approaches an intersection, an on-board transmitter sends a priority request to the traffic signal.
- **Extended/early green:** The traffic signal then can extend a green light for a few seconds so the bus can clear the intersection or bring up a green signal sooner when the bus is stopped at a red light.

TSP systems are programmed to maintain overall traffic flow and to ensure that a signal never changes before pedestrians have enough time to safely cross.

#### CURRENT APPLICATION

The City has implemented TSP on Victory Boulevard in Staten Island and on Fordham Road in the Bronx. The initial results have been positive:

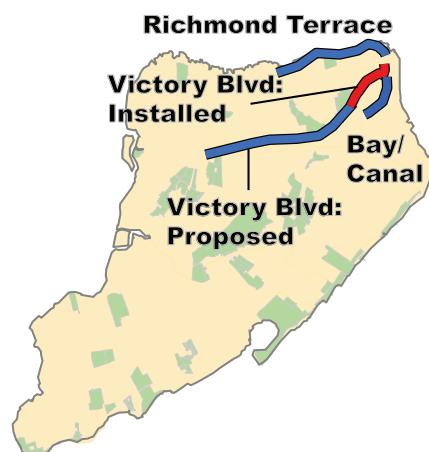
- **Improved bus speeds:** Bus travel speeds improved by as much as 20%.
- **Improved overall traffic flow:** General traffic speeds improved by as much as 10%.

## FUTURE IMPROVEMENTS

NYCDOT is in the process of developing a second generation TSP system, with the following improvements:

- **Priority for buses running late:** Future systems may give more priority to a bus that is running behind schedule and less to a bus that is running on time.
- **Dedicated turning phases:** Future systems may give a bus a dedicated phase to make a left turn where it is otherwise prohibited.
- **Leading bus intervals:** Additional deployment of systems that give a bus a small head start over general traffic at particularly congested intersections.

NYCDOT will be implementing enhanced TSP on several corridors throughout the city, shown in blue on the Citywide TSP Program map to the right.



## Off-Board Fare Payment

### OFF-BOARD FARE PAYMENT: HOW IT WORKS

Currently, bus riders in New York pay their fares one at a time when boarding. If a large number of riders are waiting for a bus, it can take several minutes before all the fares are paid and the bus pulls away. With off-board fare payment, however, customers pay before entering the vehicle at fare machines at the station and can board a bus through any door, dramatically speeding up the loading of passengers.

### CURRENT APPLICATION

As is detailed in Chapter 2, the Bx12 SBS employs a first generation off-board fare payment system, which uses modified versions of existing MetroCard and Muni Meter machines.

With off-board fare payment,  
customers pay before boarding  
the bus at fare machines at the  
station and can enter a bus  
through any door, dramatically  
speeding up boarding.

### FUTURE IMPROVEMENTS

While the current system works well, NYCT is considering a two-phased improvement to off-board fare payment:

- **Near term - improved fare payment machines:** Future versions may take cash or credit cards and be capable of selling MetroCards. These improvements may be included on SBS routes implemented in the next five years.
- **Long term - smart card technology and all door boarding:** The MTA is considering adopting a smart card system, which works much like a MetroCard, except that instead of running the card through a reader, the payer simply taps it on a sensor. This eliminates the problem of swiping a card too quickly or too slowly. Future applications of BRT may include an all door boarding system, in which passengers enter and tap their smart card at any bus door.

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RECEIPT  
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5116

METRO CARD

## Bus Lanes

### BUS LANES: HOW THEY WORK

In areas like Midtown Manhattan, Downtown Brooklyn, and Jamaica Center, congestion can wreak havoc on bus schedules and slow bus speeds to three or four miles per hour. Congestion also contributes to bus bunching: the phenomenon of several buses arriving at a stop at the same time. Part of the solution to these problems is to create dedicated bus lanes or physically-separated busways in which buses can operate free from congestion. The design of these lanes needs to take into account the width of the road, existing traffic volumes, delivery and parking activity, and other community concerns.

Bus lanes and busways are most effective at improving bus speeds when implemented on bus corridors with high levels of traffic congestion.

### CURRENT APPLICATION: CURBSIDE BUS LANES

NYCDOT and NYCT have extensive experience with bus lanes that run alongside the curb:

- **Manhattan:** Many streets in Midtown Manhattan have curbside bus lanes, including the recently enhanced bus lanes on 34th Street.
- **Fordham Road:** the Bx12 SBS in the Bronx includes curbside lanes (pictured on right) that are in effect from 7 A.M. to 7 P.M. on weekdays.

### FUTURE IMPROVEMENT: OFFSET BUS LANES

Curbside bus lanes affect the availability of parking and delivery space at the curb for residents and businesses. Offset bus lanes, which are situated next to the parking lane, can provide the same benefits as curbside lanes with reduced impact on parking and deliveries. This type of configuration is currently being tested on lower Broadway in Manhattan. The lower picture on the next page is a photo simulation of a one-way, six-lane avenue with an offset bus lane.<sup>1</sup>

<sup>1</sup> In this example, the offset bus lane would likely be paired with an offset lane going the opposite direction on a parallel one-way avenue. This is planned for the First Avenue/Second Avenue SBS route.



Fordham Road Curbside Bus Lanes



An Offset Bus Lane (Photo Simulation)

### FUTURE IMPROVEMENT: BUSWAYS

Bus lanes increase average bus speeds but require regular enforcement, since illegally parked cars undermine their effectiveness. On very wide streets with high bus volumes, fully separated busways can eliminate the enforcement problem and enable buses to achieve even greater travel time savings. The appropriate busway design for a given street depends on the street's width and lane configuration. NYCDOT is developing a range of busway options. Median busways, for example, run down the center of a street with island stations for passengers. The photo simulation on the next page shows a wide arterial street with a median busway.



Red Bus Lanes with Low Bumps

### FUTURE IMPROVEMENTS: LANE TREATMENTS

NYCDOT is also experimenting with a number of features to further enhance the effectiveness of bus lanes and busways, including:

- **Time of day restrictions:** Bus lane restrictions can be in effect during rush hours only, from 7 A.M. to 7 P.M. (as on Fordham Road) or 24 hours a day.
- **High visibility red painted lanes:** The Bx12 SBS and 34th Street bus lanes are painted a terracotta red to give a visual reminder to drivers that the lane is for buses only.
- **Soft barriers:** NYCDOT is also experimenting with soft barriers, including low bumps and flexible delineator poles, to give a physical reminder to drivers that the lane is for buses only.

### FUTURE IMPROVEMENT: CAMERA ENFORCEMENT

On Fordham Road, NYCDOT is working with the New York City Police Department (NYPD) to ensure adequate enforcement of the bus lane. Over the long-term, relying on the NYPD to cover a growing number of bus lanes will be impractical given competing demands on NYPD personnel. Therefore, the City and the MTA have proposed state legislation authorizing the use of traffic enforcement cameras at the roadside and mounted on MTA buses. These cameras would capture video of illegally parked vehicles or those driving in bus lanes. These images would be used to issue tickets by mail to violators. A test of this technology on 34th Street focusing on taxi enforcement is currently underway in coordination with the New York City Taxi and Limousine Commission.



## Improving Comfort and Convenience

Comfort and Convenience: Summary of Potential Improvements		
Feature	Current Approach	Improvements Under Consideration
Stations	Double shelters	Additional features may include more seating, waste bins, and level boarding (where feasible)
Real-Time Bus Arrival Information	Not included	Bus arrival information displayed at stations and available on the web, cell phones, and PDA's
BRT Vehicles	High-floor two-door articulated buses	Low-floor, three-door articulated buses or low-floor standard buses with automated stop announcements
Branding	Select Bus Service (SBS) brand	Brand enhancements: more distinctive buses and shelters

### Stations

#### CURRENT APPLICATION

The City is in the process of replacing its 3,500 bus shelters with new shelters that feature seating, lighting, and a bus map and schedule display. As part of the Bx12 SBS, the City installed double shelters (where space permitted) that provide additional protection from the elements.

#### FUTURE IMPROVEMENTS

Future BRT stations may include additional features such as real time passenger information displays (discussed at right), waste bins, additional seating, and level boarding platforms (where feasible).

### Real-Time Passenger Information

#### CURRENT APPROACH

NYCT currently relies on printed timetables and static Guide-a-Ride information at bus stops, which have limited value to riders on routes where traffic congestion or heavy ridership undermine schedule adherence.

#### FUTURE IMPROVEMENTS

Advanced technology now enables transit agencies to track the location of their buses and provide real-time bus arrival information at stations and on the internet, cell phones, and PDA's. NYCT is currently identifying vendors that can bring real time bus arrival information to the bus system. Assuming a workable system can be identified, NYCT intends to include this feature on future BRT routes.



Real Time Bus Arrival Display (London, England)



Bx12 SBS Station

## BRT Vehicles

### CURRENT APPLICATION

Currently, the Bx12 SBS uses high-floor, 60-foot articulated buses that have a front and rear door.

### FUTURE IMPROVEMENTS

NYCT's fleet of articulated buses will soon require replacement. The agency is identifying a vendor for a low-floor, three-door articulated bus that can be deployed on upcoming SBS routes and other high ridership corridors. Three-door, low-floor vehicles have a number of advantages over the current articulated fleet:

- **Low floors:** Passengers can more easily board a low-floor vehicle because there is only one step to climb. This is particularly important for customers with limited mobility.
- **Three doors:** Passengers can enter or exit through any of the three doors, speeding loading and unloading.
- **Level boarding:** BRT stations can be built with a higher curb—10–13 inches above the street level—providing customers with near-level boarding.

NYCT anticipates that these buses, which will meet or exceed the highest federal emissions standards, will be available for future high-ridership SBS routes. Future routes with more moderate passenger volumes may be served by 40-foot low-floor buses.

## Branding

NYCT and NYCDOT will continue to give BRT services in New York a unique brand to better communicate BRT's enhanced features to passengers. BRT branding also helps passengers to quickly distinguish BRT buses by their color from NYCT local buses. The current SBS brand includes a distinctive logo and blue color scheme, and NYCT and NYCDOT are exploring ways to enhance and expand the SBS brand in future BRT applications.

NYCT is planning on replacing its current fleet of high-floor articulated buses with three-door, low-floor models, which can speed boarding and improve access for riders with mobility impairments.

Bx12 SEDWICK AV

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## 5. NEXT STEPS

NYCT and NYCDOT released this report as a first step towards creating a comprehensive BRT network for New York City. In May and June we will hold a series of public workshops across the city to discuss the findings of this report. Participants will have the opportunity to comment on the service needs we identified, to propose the inclusion of other needs, and to learn about BRT and its potential to provide fast and reliable transit service. NYCT and NYC-DOT will also meet with elected officials, community board members, our government partners, business groups, community organizations, and other key stakeholders. This report will also help inform the MTA's five-year capital plan, which will be released in the fall of 2009.

Once the workshops are completed, NYCT and NYCDOT will incorporate the public's comments and ideas into a final BRT Phase II Plan that will be released in the fall of 2009. The final report will identify eight to 10 potential BRT corridors for further planning. These corridors will be chosen based on ridership potential, transit need, geographic diversity, opportunities for bus priority treatments, and community support.

BRT Projects Timeline	
Date	Milestone
<b>May - June 2009</b>	<b>Public workshops</b> <ul style="list-style-type: none"> <li>Feedback on potential corridors</li> <li>Discussion of transit needs</li> <li>Public education on BRT</li> </ul>
<b>Summer - Fall 2009</b>	<b>Corridor Selection</b> <ul style="list-style-type: none"> <li>Announcement of 8-10 corridors for further development</li> <li>Release of Final BRT Phase II Plan</li> </ul>
<b>Fall 2009 and ongoing</b>	<b>Corridor Planning</b> <ul style="list-style-type: none"> <li>Stakeholder outreach</li> <li>Formation of community advisory committee for each corridor</li> <li>Development of detailed BRT corridor plans</li> </ul>
<b>2010 - 2020</b>	<b>Implementation of BRT Routes</b> <ul style="list-style-type: none"> <li>First Avenue/Second Avenue SBS (2010)</li> <li>Nostrand Avenues SBS (2011)</li> <li>34th Street SBS Phase II Busway</li> <li>Hyland Boulevard SBS</li> <li>First group of BRT Phase II Plan routes</li> </ul>

## From Service Needs to BRT Corridor Plans

Planning for these eight to 10 BRT corridors will be based on feedback to this report and intensive community engagement. At the core of our efforts to involve the public will be a community advisory committee (CAC) made up of representatives from local community boards, neighborhood organizations, institutions such as hospitals and schools, and the local business community, as well as bus riders. Local elected officials will also be invited to participate. NYCT and NYCDOT have started this outreach process for the First Avenue/Second Avenue and Nostrand Avenue SBS corridors, for which preliminary route concepts are in place. For each of the eight to 10 corridors identified in the final BRT Phase II Plan, NYCT and NYCDOT will work with the CAC to:

- **Evaluate existing conditions**, including transit needs and traffic volumes.
- **Identify a range of potential BRT solutions**, including various route options and approaches to bus lanes.
- **Assess alternatives**, taking into account transit rider benefits and the impact on traffic and parking of various BRT approaches.
- **Develop a BRT corridor plan**; this plan will take into account the needs of bus riders, community residents, local businesses, and neighborhood institutions.

### Project Website: [www.nyc.gov/brt](http://www.nyc.gov/brt)

NYCT and NYCDOT have also launched a BRT website, which will include:

- **Information on BRT**
- **A video on the Bx12 SBS pilot project on Fordham Road in the Bronx**
- **An on-line survey allowing residents and other interested parties to submit their ideas and comments in response to this report**

NYCDOT and NYCT will also develop a funding plan for each BRT route. To support construction of new bus lanes, busways and stations, the two agencies will pursue federal funds from a variety of sources, including the Federal Transit Administration's Small Starts program. NYCT will also evaluate potential operating cost savings from each route from improved bus speeds. These cost savings along with modest increases in revenue could be used to offset operating cost increases associated with implementing new BRT routes.

Our goal in moving forward is simple: to develop BRT routes that benefit existing bus riders, provide an attractive transit option to potential new customers, and are sensitive to the needs of local residents and businesses. NYCT and NYCDOT look forward to working closely with communities across the city to plan and implement these vital mobility improvements.



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