

SUMMARY REPORT

Greater New Brunswick Area Bus Rapid Transit Study – Phase 1

Task Order No. 3

Public Transit Planning and Analysis Task Order Contract 06-042A

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NJ TRANSIT

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Table of Contents

1. Study Area and Purpose	1
2. Study Goals and Project Objectives	3
3. Target Market and Problem Identification	5
3.1 Existing Conditions	5
3.2 Market Assessment	11
4. Identification of BRT Alignments and Features	13
4.1 Approach to Alignment Development.....	13
4.2 Future Vision for BRT	13
4.3 Start-up BRT Alignments	14
4.4 BRT Features	16
4.5 Recommended Improvements.....	18
5. Costs and Impact Evaluation.....	31
5.1 Capital Costs	31
5.2 Ridership.....	33
5.3 Operating Costs, Revenue and Net Operating Cost	34
6. Prioritization and Phasing	37
7. Marketing and Policy Recommendations.....	39
7.1 Marketing Strategies.....	39
7.2 Policy Recommendations	39
8. Stakeholder Involvement Process	41
8.1 Core Stakeholder Group.....	41
8.2 Expanded Stakeholder Group.....	42
9. Next Steps.....	45

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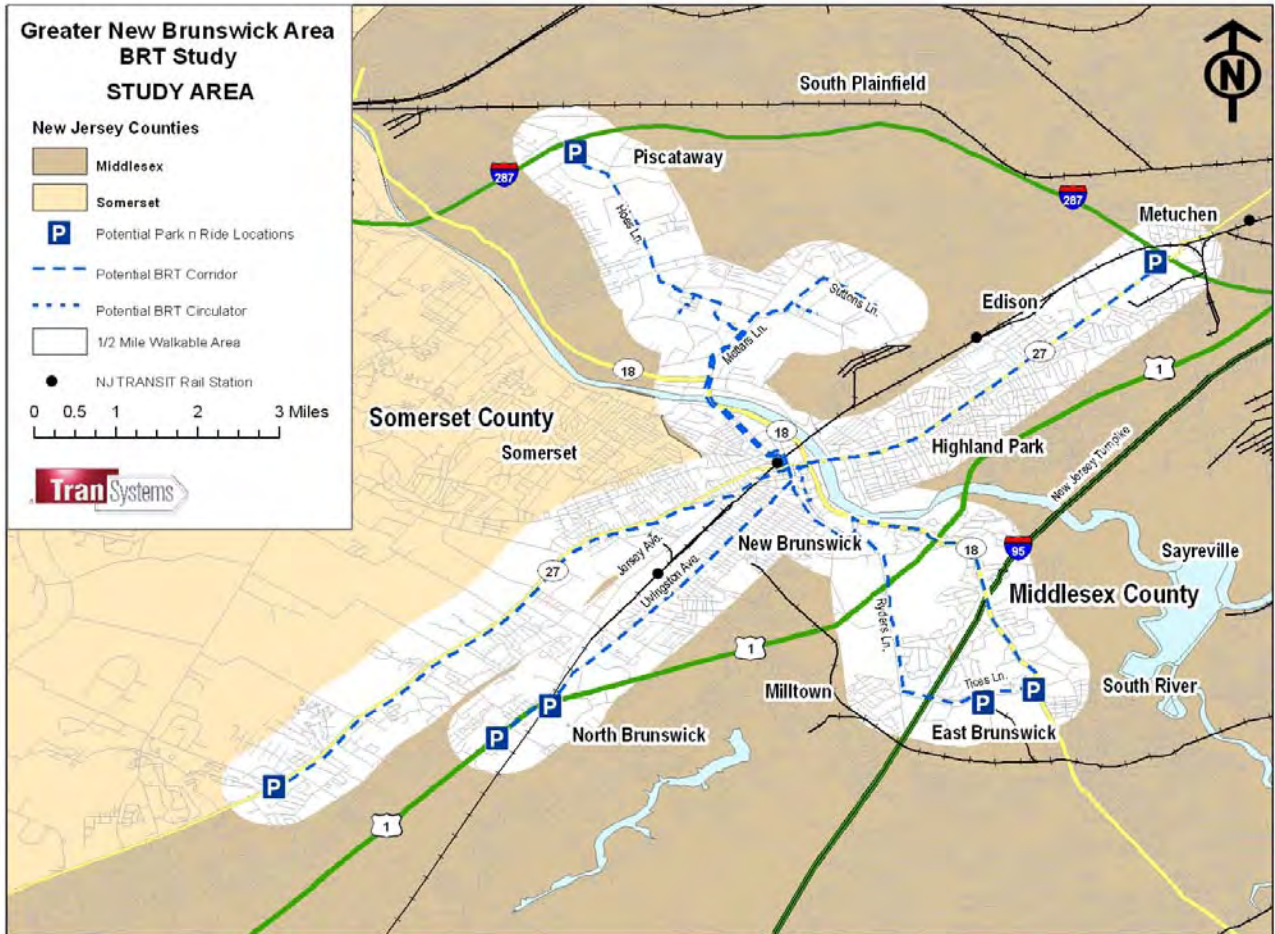
1. Study Area and Purpose

NJ TRANSIT, in collaboration with the North Jersey Transportation Planning Authority (NJTPA), initiated this study to develop a preliminary concept for a Bus Rapid Transit (BRT) system in the Greater New Brunswick Area. Based on the belief that BRT has particular applicability to two general corridors in the area, this study was designed to focus on the Route 18 and 27 corridors, which intersect at the New Brunswick Rail Station. The Route 18 corridor, which links several Rutgers University campuses, had been studied for potential fixed-guideway LRT or BRT transit in 2001; that study concluded that transit in the corridor would attract substantial ridership, much of which would be generated by Rutgers University. The second corridor of interest is along Route 27 which serves residential and commercial areas and connects them with downtown New Brunswick, the Northeast Corridor rail line at New Brunswick Station, the College Avenue campus and other destinations on the Route 18 corridor, and the proposed Route 1 BRT to the south currently being developed by NJ TRANSIT. Each corridor would also serve important existing outlying travel generators and new developments. The study was designed to determine how BRT concepts might be applied to one or both of the corridors.

At the outset of the study, the exact study area needed to be clarified, since the intention was not to limit the study to Route 18 and 27 specifically but to treat them as more general corridors. Thus an early task in the study was an examination of the travel generators and travel patterns along these two axes in the Greater New Brunswick Area. Among the key sources of information examined were Rutgers University commuting by students, faculty and staff (used as a proxy for all commuting which was investigated subsequently), as well as the InfoUSA data on large employers. The result of this investigation was the study area shown in Figure 1. The figure shows the study area for the Greater New Brunswick Area BRT Study, including a half-mile walk catchment area around the preliminary study corridors. This study area definition was used as the basis for further work on analysis of needs and opportunities.

The development of BRT in these corridors could place new demands on New Brunswick Station where significant issues already exist regarding traffic and pedestrian circulation and the interaction between intercity rail and NJ TRANSIT commuter rail services, NJ TRANSIT and other local buses, intercampus shuttles, commuter shuttles, bicycle, taxi, and walk modes. The study therefore also included a separate task to address potential improvements at New Brunswick Station which could be implemented either in conjunction with BRT, or separately and in advance of BRT. The development of the mixed-use Gateway Center project at the New Brunswick Station by the New Brunswick Development Corporation (DEVCO) will create a “once in a lifetime” opportunity to simplify and create new pedestrian circulation and linkages between the station and the Rutgers College Avenue campus. While some of the larger improvements at the station need to be coordinated with the evolving plans for the Gateway Center there are a host of other, smaller scale station improvements that can proceed independently of these plans.

Figure 1: BRT Study Area and Study Corridors



*Note: The study area also consisted of five-mile semi-circular drive catchment areas around the potential Park & Ride facilities at the ends of the study corridors; these larger catchment areas are not shown on the map.

To carry out the study objectives, the study scope included the following tasks:

1. Data Collection
2. Develop and Assess Alignment Alternatives
3. Develop Pedestrian and Vehicular Circulation Improvements for the Area Surrounding New Brunswick Station
4. Define BRT Elements
5. Develop a Conceptual System Plan
6. Public Outreach
7. Marketing Strategies/Policy Coordination
8. Core Team, Stakeholder and Agency Coordination Meetings

TranSystems led the consulting team (which included STV Incorporated, Eng-Wong, Taub & Associates, Howard/Stein-Hudson Associates and El Taller Colaborativo) in conducting the study for NJ TRANSIT and NJTPA. NJ TRANSIT contracted separately with Voorhees Transportation Center (of Rutgers University) to conduct the bulk of the Task 1 data collection and the Task 7 analysis of marketing strategies and policy coordination.

2. Study Goals and Project Objectives

The following study goals were formulated in discussions with a Core Group of stakeholders convened for the study:

- The priority needs and desired outcomes related to transit service in the Greater New Brunswick Area must be understood.
- The study needs to determine which of the many BRT options is best for the study area.
- BRT alternatives should be tailored to the specific problems that need to be solved, and the benefits of the alternatives should be clearly presented.
- The alternatives should be discussed with a range of stakeholders.

The specific project objectives (that is, desired outcomes) identified by the stakeholders included:

- Better levels of bus service that can attract choice riders
- Bus service that is more visible and easier to use and comprehend
- Easy connections to BRT from rail (e.g., at the New Brunswick rail station)
- Potential park-and-ride facilities near major regional roadways, including Route 18, Route 27, Route 1, Interstate 287, and the New Jersey Turnpike
- An integrated fare system for BRT
- Easily accessible and up-to-date bus schedule information
- Information kiosks at rail stations & park and rides
- Parking policies to encourage more transit use
- BRT as one of the modes accommodating growth
- A transit service that can complement and foster compact land use, including Transit-Oriented Development
- Recommendations for infrastructure or service improvements for corridors considered but not selected as candidate alignments for the start-up BRT system

In summary, it was suggested that the proposed BRT service for the Greater New Brunswick Area should achieve three overriding objectives: (1) be comfortable and user-friendly, (2) be rapid and reliable, and (3) be affordable.



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3. Problem Identification and Market Assessment

3.1 Existing Conditions Assessment

The study began by compiling an inventory of existing conditions in the study area to help identify opportunities and problems. This task was undertaken by Voorhees Transportation Center. The following existing and future planned conditions were examined:

- Population and Employment Concentrations and Characteristics
- Land Use including planned developments
- Roadway System Characteristics and Improvements
- Rail Transit System Characteristics including the New Brunswick Train Station
- Bus Transit System including services provided by NJ TRANSIT, Rutgers University (RUDOTS), the counties, private operators and others
- Pedestrian and Bicycle Accommodations

This information showed that the study area has a number of unique characteristics including:

- High level of commuter rail service on the Northeast Corridor including intercity and commuter service,
- Significant rail commuter market to New York City and northern New Jersey,
- Large, multi-campus university with:
 - Annual influx of new residents and commuting students
 - Master plan focused on managing parking and increasing use of transit
 - High quality, frequent shuttle bus system (RUDOTS)
- Growing roadway congestion,
- Phased set of roadway improvement projects (Route 18),
- Nascent revitalization of the downtown,
- Relatively large numbers of bicycle travelers,
- Complex array of largely infrequent transit services that may not be easy for potential users to understand,
- A highly concentrated market of existing bus riders in the core (primarily using the RUDOTS shuttle bus system) and a much smaller existing market in surrounding areas.

Figure 2 shows the existing transit services in the Greater New Brunswick Area. As shown in the figure, the area is served by a variety of providers. While the combined system offers considerable coverage of major travel generators, bus service is relatively infrequent and customer information is somewhat limited, except for RUDOTS service between the various campuses of Rutgers

University which is frequent and has introduced advanced customer information systems. RUDOTS is also unique in offering free fares, and low-floor, articulated buses.

Tables 1A and 1B summarize the existing fixed-route bus service in the Greater New Brunswick Area. Table 1A presents NJ TRANSIT, Coach USA, Middlesex County, and Somerset County routes. Table 1B summarizes service provided by RUDOTS.

Figure 2: Existing Transit Routes in the Greater New Brunswick Area

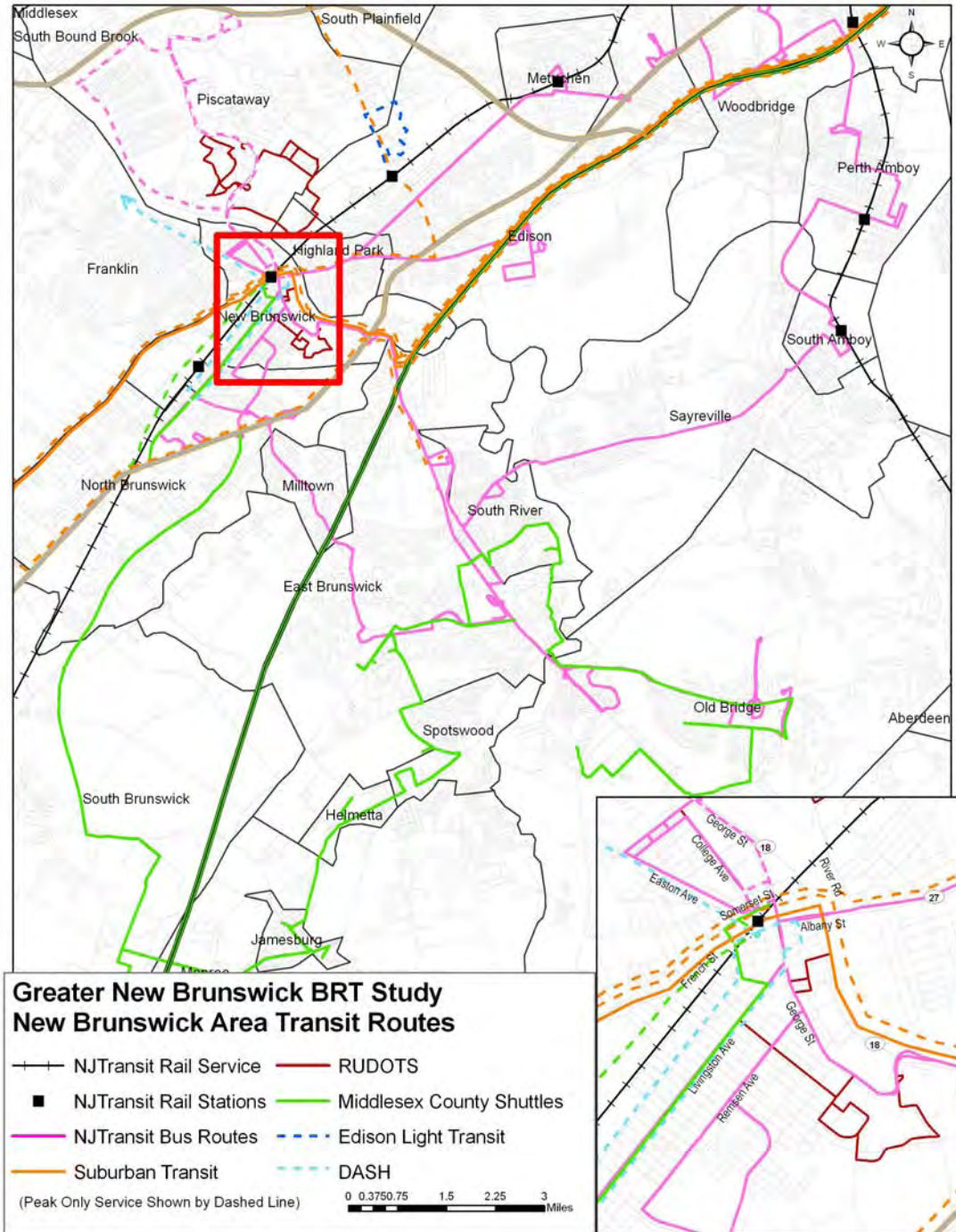


Table 1A: Summary of Fixed-Route Bus Service in the Greater New Brunswick Area
(All Services except RUDOTS)

Route	Service Area	Weekday Peak / Off-Peak Frequency (minutes)	Notes
NJ TRANSIT			
810	NB Rail Station to Woodbridge Center Mall including Highland Park, Edison, and Metuchen	60 / 60	Average of 1041 weekday, combined Northbound/Southbound boardings. 129 weekday boardings in New Brunswick. Hourly service on weekends.
811	NB Rail Station to South River including East Brunswick, Milltown, and North Brunswick	60 / 60	Average of 235 weekday, combined Northbound/Southbound boardings. 181 weekday boardings in New Brunswick. No weekend service.
814	North Brunswick (Fashion Plaza) to Edison (Middlesex Co. College) including NB Station	30 / 60	Average of 1009 weekday, combined Eastbound/Westbound boardings. 516 weekday boardings in New Brunswick. No Sunday service.
815	NB Rail Station to Woodbridge Center Mall including Perth Amboy, South Amboy, Sayreville, South River, and East Brunswick	30 / 60 to 75	Busiest NJT bus route in area with average weekday ridership of 1248 boardings for both directions combined. 180 weekday boardings in New Brunswick. Hourly service on weekends.
818	NB Rail Station to Old Bridge including East Brunswick	50 to 60 / 60 to 90	Average weekday ridership of 953 boardings for both directions combined. 199 weekday boardings in New Brunswick. Hourly service on weekends.
980 WHEELS	NB Rail Station to Piscataway (River Road, Centennial Avenue, Hoes Lane)	20 to 40 / -- (Peak only)	Average weekday ridership of 71 boardings for both directions combined. Limited weekday service in the early morning. No weekend service.
Coach USA/Suburban Transit			
100	Princeton, Kendall Park, Franklin Park, New Brunswick, East Brunswick, NYC-Port Authority Bus Terminal	15 / 30	Service every 30 minutes on weekends except hourly to North Brunswick and points south. 60 min. scheduled running time to Port Authority Bus Terminal in New York.
500	Kendall Park, New Brunswick, East Brunswick, NYC-Grand Central Terminal	10 to 55 / -- (peak only)	More frequent service from East Brunswick. 60 min. scheduled running time to Grand Central. No weekend service.
600	Princeton, Kendall Park, North Brunswick, New Brunswick, E. Brunswick, NYC-Battery Park	60 / -- (peak only)	Much more frequent service from East Brunswick northward. No weekend service. 73 min. scheduled running time to Battery Park.
Dunellen Local	Kendall Park and New Brunswick to Dunellen	4 round trips per day	Serves the Dunellen Rail Station on the Raritan Valley Line.

Table 1A: Summary of Fixed-Route Bus Service in the Greater New Brunswick Area
(All Services Except RUDOTS)

Route	Service Area	Weekday Peak / Off-Peak Frequency (minutes)	Notes
Middlesex County			
Jersey Ave. Shuttle	NB Rail Station to the southern end of Jersey Avenue near Route 1	30 / -- (peak only)	Total Eastbound/Westbound average weekday ridership of 25 passengers. No service from approx. 8:45 AM to 3:00 PM and Sundays.
Jamesburg Shuttle (8A)	Peak-hour service between Perth Amboy, New Brunswick and Exit 8A; Off-peak service between New Brunswick and Jamesburg	60 / 60	Average of 172 weekday, combined Northbound/Southbound boardings. Limited Saturday service. No Sunday service. No weekend service to NJ Turnpike Exit 8A area.
Hub City Trolley	New Brunswick and North Brunswick	90 – 120 (Six trips per day)	No Sunday service. About 130 riders per day based on 2007 information.
Somerset County			
DASH	NB Rail Station to Davidson Avenue in Somerset	75 / -- (peak only)	Average of 115 weekday, combined Eastbound/Westbound boardings. Connects to a second DASH shuttle to Bound Brook at Davidson Avenue in Somerset. No weekend service.

Table 1B: Summary of Fixed-Route Bus Service in Greater New Brunswick Area
(RUDOTS Weekday Service)

		6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	12 AM	1 AM	2 AM	3 AM	4 AM			
A	College Ave to Busch (ARC Building first)		7-10AM EVERY 10 MINUTES	10AM - 9PM EVERY 6 MINUTES												9-10:10 PM EVERY 10 MINUTES	10:24 PM - 2:36 AM EVERY 18 MINUTES										
B	Livingston to Busch		7 AM - 8 PM EVERY 6 MINUTES												8 - 10 PM EVERY 12 MINUTES	10 PM - 2:24 AM EVERY 24 MINUTES											
C	Busch Commuter Parking Shuttle		7:30 AM - 7:30 PM EVERY 10 MINUTES																								
EE	College Ave. to Cook/Douglass		7AM - 3PM EVERY 8 MINUTES				3PM - 7PM EVERY 10 MINUTES				7 - 10:30 PM EVERY 15 MINUTES				10:30 PM - 2:36 AM EVERY 18 MINUTES												
F	College Ave. to Cook/Douglass via Suydam Street	7-9:49 AM EVERY 9 MINUTES	10 AM - 9 PM EVERY 10 MINUTES																								
H	College Ave. to Busch (Student Center first)		7AM - 9 PM EVERY 8 MINUTES																								
L	College Ave. to Livingston	7-10 AM EVERY 10 MINUTES	10 AM - 8:48 PM EVERY 8 MINUTES												8:48 - 10:24 PM EVERY 10 MINUTES	10:24 PM - 2:36 AM EVERY 18 MINUTES											
LX	College Ave. to Livingston Express	7-10 AM EVERY 10 MINUTES	10 AM - 8 PM EVERY 8 MINUTES																								
REXB	Douglass/Cook to Busch Express		7 AM - 11 PM EVERY 14 MINUTES																								
REXL	Douglass/Cook to Livingston Express		7 AM - 11 PM EVERY 14 MINUTES																								
NBQS	New BrunsQuick Shuttle		6:00 AM - 9:30 PM EVERY 10 MINUTES												9:30 PM - 1:50 AM EVERY 20 MINUTES												

In addition to the fixed-route bus services summarized above, the Greater New Brunswick Area has extensive rail service, focused on the station in downtown New Brunswick. New Brunswick Station is a key train station along the Northeast Corridor (NEC) railroad line, and is NJ TRANSIT's seventh busiest commuter rail station with approximately 5,800 passenger boardings each weekday. Two rail operators—NJ TRANSIT and Amtrak—serve this station. The former provides regional rail access to New York City, Newark, Trenton, and other intermediate stations, while the latter operator offers limited frequency, longer distance, intercity rail access to Philadelphia, Washington and Boston (as well as Newark and New York City) where additional rail connections may be made.

This combination of both regional and longer distance, intercity train service offers New Brunswick (and vicinity) residents and visitors somewhat better railway service and access than at most Northeast Corridor rail stations. Altogether 119 NJ TRANSIT and 3 Amtrak trains serve this station each weekday. In Fiscal Year 2007 there were 6,820 Amtrak boardings and alightings at New Brunswick Station.

The assessment of existing conditions included field visits to gain familiarity with the study area conditions and to gather data about transit and traffic operations. A particular focus of these efforts was observing conditions in and around New Brunswick Station. A number of problems were identified based on these field observations, as summarized below:

Wayfinding:

- There is a lack of pedestrian, bicycle, and automobile- oriented wayfinding to the station.
- There is poor wayfinding within the station complex to connecting buses, other transportation services and to local points of interest.
- The relationship between the station and downtown points of interest is not clear.

Customer Information and Amenities:

- There is limited information available to the customer in advance of arriving at the station about the station, connecting transit services, and surrounding neighborhood.
- There is limited information at the station about the location and schedules for other transit providers.
- Customer service notices are placed in an ad hoc manner.
- There are dark, uninviting pedestrian tunnels cutting under the embankment/tracks.
- There are fewer customer amenities on the southbound train platform.
- Graffiti on station walls, street furniture and signage.
- Billboards, illuminated advertising panels and station tenant displays both within and outside the station detract from the station's ambience.
- Cluttered station exterior.

Pedestrian Accommodations:

- Pedestrians routinely do not use the crosswalks provided.
- Vehicles don't yield to pedestrians in the crosswalk despite the presence of warning signage.
- The mid-block crosswalk on George Street is at an oblique angle increasing pedestrian walk distance.
- The design of the median on Albany Street tends to encourage pedestrians to jaywalk.
- A significant number of pedestrians cross Easton Avenue at Wall Street/Little Albany Street where there is no crosswalk.
- The pedestrian signal head at the intersection of Albany Street and Easton Avenue is difficult to see.
- There are a number of pavement hazards leading to the elevators.

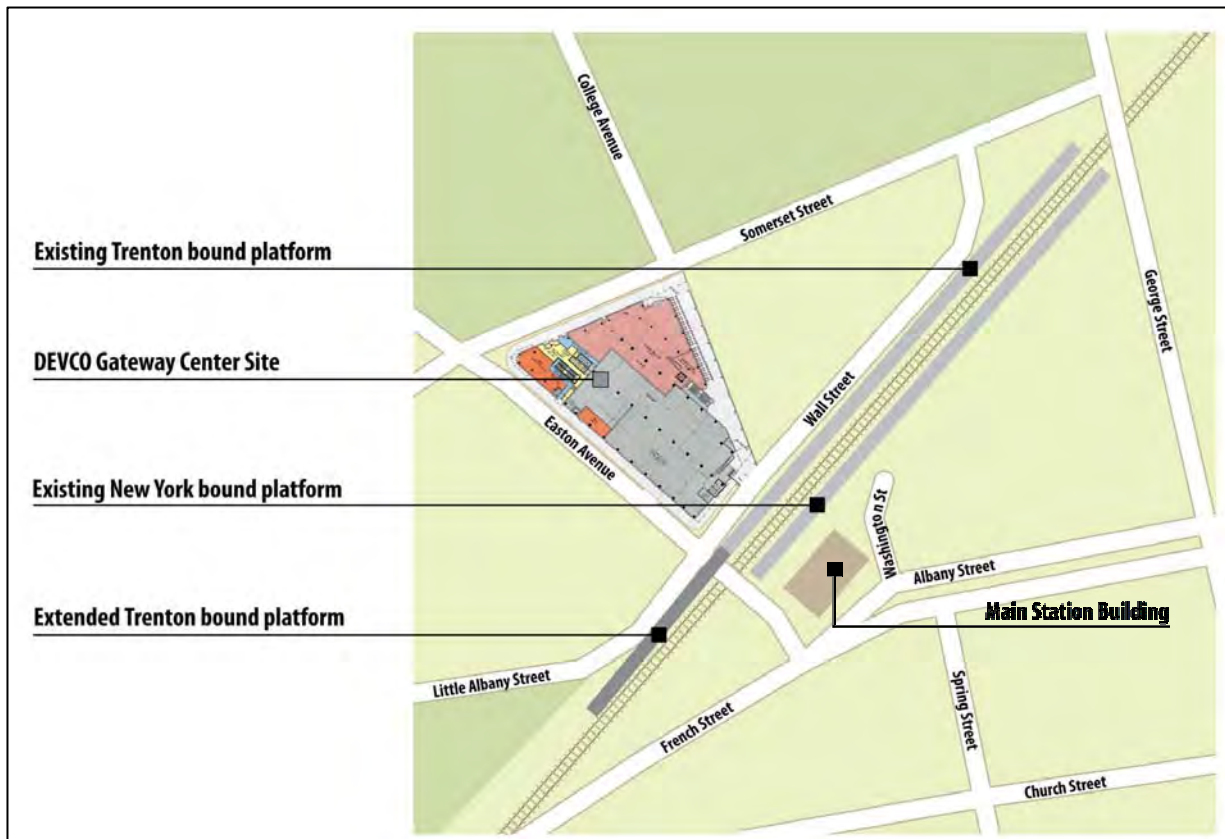
Bicycle Accommodations:

- There is no centralized area for bicycles. Rather, bike parking facilities are "shoe-horned" into station areas all around the station.
- There are no bike lanes or designated bicycle travel ways in the vicinity of the station even though there are a significant number of people who access the station via bicycle.

At the same time, new opportunities were identified upon which to build a better station environment, including the proposed DEVCO Gateway Center project and the proposed platform extension under the Liberty Corridor project. The Gateway Center is a proposed new mixed use project located immediately north of the train station on Somerset Street and Easton Avenue. The Gateway will feature a 24-story luxury residential tower, with a "destination" bookstore, restaurants and other retail uses. The New Brunswick Station Platform Extension and Elevator Improvements under the Liberty Corridor Project will construct a new link between the station and the adjacent medical research complex including the Cancer Institute of New Jersey and Robert Wood Johnson University Hospital. This link would be established by extending the station platforms westward across Easton Avenue.

Figure 3 shows New Brunswick Train Station and its immediate environs, including the proposed DEVCO Gateway Center development and the platform extension improvements under the Liberty Corridor Project.

Figure 3: New Brunswick Station Area Showing Planned Gateway Center and Westward Platform Extension



3.2 Market Assessment

The next step of the study was an assessment of the potential target market for BRT and other transit improvements. Several potential markets for BRT service in the Greater New Brunswick Area were identified and assessed, including:

- Commute Trips to Rutgers University (Student/Faculty/Staff)
- Trips to/between Rutgers University Campuses
- Local Work-Trip Travel
 - Trips to Downtown New Brunswick
 - Trips to outlying employment centers ("local reverse commute")
- Local Non-Work Travel
 - Trips to Downtown New Brunswick
 - Local special event travel
- Access/Egress for New Brunswick Rail Station Trips
 - Access to New Brunswick Station to workplaces outside study area (NYC, Newark, Trenton, Philadelphia)
 - Egress from New Brunswick Station to workplaces in study area

Based on market assessment, the following conclusions were drawn:

- One of the largest market segments is likely to be Rutgers University travelers, both for commute trips to campus and for travel between the five Rutgers campuses in New Brunswick and Piscataway.
- Work trips to downtown New Brunswick are likely to be another significant market for BRT service, particularly with the growth of institutions such as Robert Wood Johnson, St. Peters Medical Center, and other major employers.
- Rail is currently a significant mode of work travel to downtown New Brunswick from some locations, but bus travel to downtown New Brunswick is relatively small. This suggests that there may be an untapped market for BRT service if it can offer time, cost or convenience advantages over current bus services.
- The northeast-southwest axis (Edison-Highland Park-New Brunswick-North Brunswick) generally has higher potential ridership than the northwest-southeast axis (Piscataway-New Brunswick-East Brunswick) for non-Rutgers trips.
- The study corridors identified cover Rutgers commuters and most other trips fairly well. Somerset, Franklin, and some East Brunswick trips not covered by the walkable catchment area but are still in the potential Park & Ride catchment area at ends of the corridors.
- The percentage of travelers accessing New Brunswick Station by bus or shuttle is roughly 10% in the AM Peak. North Brunswick is the most common origin for travelers accessing New Brunswick Station by bus or shuttle, with 50 passenger arrivals in the AM Peak period. Given the number of rail passengers using New Brunswick Station, these relatively small numbers of travelers accessing the station by bus or shuttle suggest the potential for additional growth in access to commuter rail by BRT or enhanced bus service.

4. Identification of BRT Alignments and Features

4.1 Approach to Alignment Development

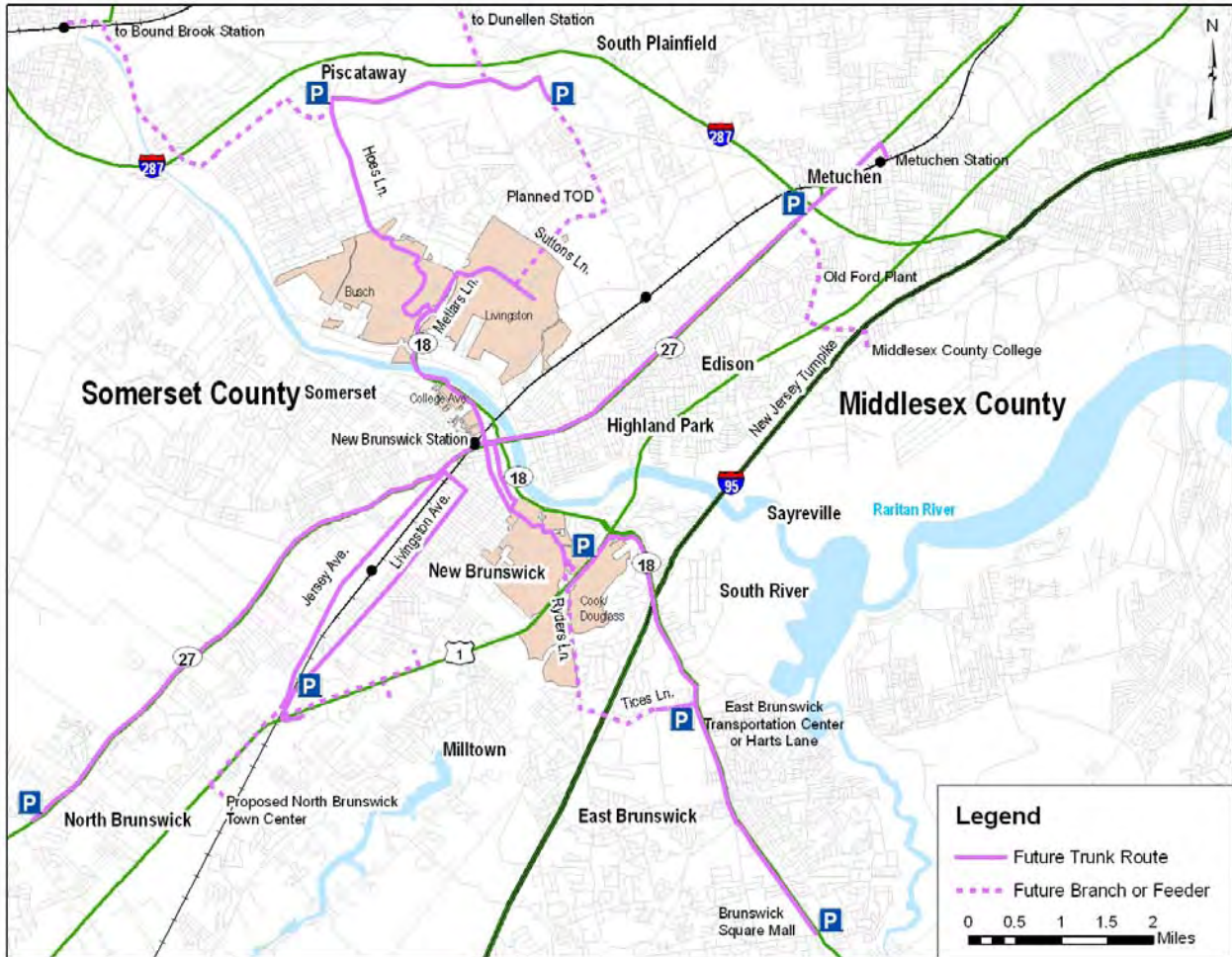
The Study Team used the following approach to develop the potential BRT alignments:

1. BRT study corridors were developed based on the original study scope, early analysis of travel patterns, and feedback from the Core Stakeholder Group.
2. The Study Team conducted field investigation of the BRT study corridors, toured portions of the area with RU DOTS staff, and performed further analysis of travel markets and issues.
3. Initial alignment options were developed based on the BRT study corridors and by selecting roadway segments that would be likely to accommodate BRT service and serve the travel market.
4. These initial alignment options were presented to the Core Stakeholder Group in June 2007, and feedback was received.
5. A vision for the future Greater New Brunswick Area BRT System was developed, along with alternatives for a startup system.
6. An evaluation matrix was developed and used by the Study Team to compare the alternative segments of the startup system. The startup system segments that were ranked highest in the evaluation matrix were then analyzed in combination to identify the most feasible startup alignments.
7. Potential station locations on the candidate startup alignments were identified.
8. The vision of the future BRT system, the candidate startup alignments, and the potential station locations were presented to NJ TRANSIT, NJTPA and the Core Stakeholder Group in September and October 2007, and feedback was received.
9. The vision of the future BRT system, the candidate startup alignments, and the potential station locations were adjusted to respond to comments.

4.2 Future Vision for BRT

The study team developed a vision for a future BRT system in the Greater New Brunswick Area that included several route alignments serving a wide variety of travel generators in the Route 18 and Route 27 corridors. This vision is shown in Figure 4.

Figure 4: Proposed Vision for a Future Greater New Brunswick Area BRT System



4.3 Start-up BRT Alignments

Recognizing that the above full vision of BRT would take years to develop, the study team focused on a start-up system and identified several candidate alignments with the greatest potential for implementation in the near-term. In each quadrant of the region, alternative alignments were examined and compared.

Based on the evaluation of segments and pairings, the Study Team identified three alignments that appear to hold the greatest potential as candidate startup BRT alignments: (see Figure 5)

- **Green Alignment** ('Route 18 Northwest' to 'Route 27 Southwest'): An alignment from Piscataway through downtown New Brunswick to Livingston Avenue.
- **Blue Alignment** ('Route 27 Northeast' to 'Route 27 Southwest'): An alignment from Edison through Highland Park and downtown New Brunswick to Livingston Avenue.
- **Red Alignment** ('Route 18 Northwest' to 'Route 18 Southeast'): An alignment from Piscataway through downtown New Brunswick to the Cook/Douglass Campus area.

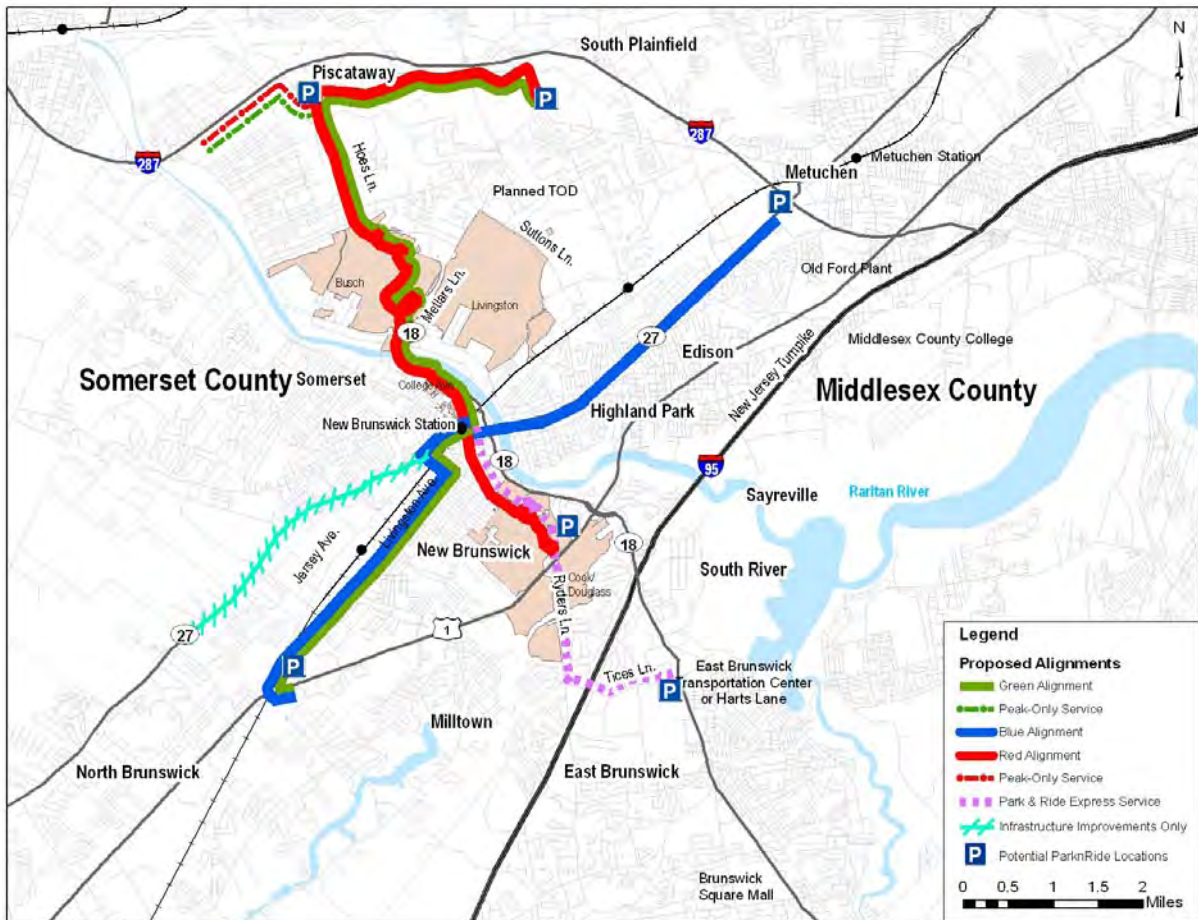
The start-up system could include any of the three alignments or combinations of them. Recognizing that it was likely that one alignment might eventually be selected to be implemented first, the study team continued to analyze and develop each of the three candidate alignments independently.

In addition to the three start-up BRT alignments, the Study Team identified:

- 1) Potential infrastructure improvements in the Route 27 corridor to the southwest of New Brunswick to support existing private carrier bus service, and
- 2) Potential new park-and-ride express bus service between East Brunswick and downtown New Brunswick.

These non-BRT improvements were identified as steps that could lay the groundwork for potential future BRT service in these areas, as the start-up system moves to expansion.

Figure 5: Candidate BRT Start-up Alignments and Other Potential Improvements



4.4 BRT Features

Bus Rapid Transit employs a variety of elements to reduce the time it takes to travel using the system and to make travel more convenient and comfortable for the riders. These elements present the BRT planner with a menu from which to choose. The elements are selected to match the particular circumstances of the corridor including the problems experienced by the existing conventional bus service and ridership, the physical and operational constraints in the corridor or bus operating environment, and finally the specific opportunities that may present themselves. While Bus Rapid Transit can be developed in a flexible manner using this menu of options, selecting only a few elements would not create a Bus Rapid Transit service but simply an enhanced bus service or more rapid bus service that could be a forerunner to Bus Rapid Transit.

The essential elements of Bus Rapid Transit are:

- 1) Simple, easy-to-understand routes and service design
- 2) Short wait times throughout the day
- 3) Wide station spacing
- 4) High amenity stations
- 5) Fast fare collection (and therefore fast boarding and alighting)
- 6) Priority for buses in the traffic stream through engineering and technology strategies
- 7) High level of customer information
- 8) Enhanced vehicle design
- 9) Branding and image

A wide variety of BRT elements and options are used in other BRT services in the United States. BRT elements included in the concept for BRT in the Greater New Brunswick Area considered the following guidelines:

- Tie the solutions to the goals expressed by the Core Group and other stakeholders, i.e.,
 - Fast and reliable trip times
 - Readily available
 - Easy to understand and use
 - Unique image
 - High quality/many amenities
 - Feasible and affordable
- Address the specific problem areas that have been identified with the current bus system, including:
 - Limited frequency and span of service in areas beyond the coverage of the RU DOTS system
 - Gaps in service coverage to employment sites in Edison, East Brunswick, and Piscataway
 - Significant congestion and dwell time delays around downtown New Brunswick, Rutgers campus centers, and other key areas
 - Substantial projected increases in traffic congestion across the area by 2010 and 2030
- Consider the physical, operational, financial, and institutional feasibility and constraints associated with proposed solutions

The elements of BRT recommended for consideration for the Greater New Brunswick Area BRT startup alignments are:

- Understandable route design, longer stop spacing, and frequent service throughout the day
- Improved image with enhanced shelters/vehicles/branding
- Improved vehicle characteristics
- Faster fare collection and boarding
- Traffic signal coordination, optimization, and transit priority measures to reduce delay
- Bus lanes or queue jumpers where possible/advantageous
- Real time information at BRT stops

More specifically, the following are recommended:

- Route Design
 - Simple route structure
 - Wider station spacing
 - Span and frequency improvements
 - Park-and-Ride gateways
 - Feeder/shuttle connections
- Stations
 - Enhanced shelters with a high level of amenities
 - Safety/security improvements
- Vehicles
 - Low-floor, high performance buses
- Branding
 - Name, logo, color and graphics
 - Unique look for buses and stations
- Boarding/Fare Collection
 - Level or near-level boarding at all or key stations
 - Multiple door POP boarding at all or at the busiest stations
 - Fare integration policies
- Priority Elements
 - Pair of one-way exclusive lanes in downtown New Brunswick
 - Signal optimization and coordination
 - Transit signal priority at key intersections
 - Queue jumpers at selected intersections outside downtown
 - Bus-only connection between Davidson Road and Hoes Lane
 - Bus-only left turn at George Street / Albany Street intersection
 - Other minor traffic engineering improvements at intersections to benefit both BRT and other traffic
- Information
 - Improved static information at stations
 - Real-time information signage at stations, web and on PDAs
 - In-vehicle annunciation

These elements are reflected in the recommended improvements summarized in the next section.

4.5 Recommended Improvements

The study recommendations include the following four primary elements:

1. Development of Bus Rapid Transit service along at least one of the three candidate start-up alignments
2. East Brunswick Park-and-Ride Express Bus Service
3. Infrastructure improvements along Route 27 southwest of downtown New Brunswick to support existing private bus services in the corridor
4. Improvements at the New Brunswick Railroad Station to address bus and rail passenger needs, intermodal transfers, customer information and wayfinding and pedestrian, bicycle and vehicular traffic needs

Table 2 below summarizes the nature of the corridor improvements.

Table 2: Summary of Proposed Startup System Improvements

Component	Service Improvements					Physical/Infrastructure Improvements					
	New service coverage/type	Improved span	Improved frequency	Improved vehicles	Enhanced Stops	Park & Rides	Signal progression/optimization	Signal priority	Queue jumpers	Bus-only connection	Bus lanes
BRT Alignments											
Green Alignment	√	√	√	√	√	√	√	√	√	√	
Blue Alignment		√	√	√	√	√	√	√	√		
Red Alignment	√	√	√	√	√	√	√	√	√	√	√
Other Improvements											
Route 27 Southwest					√		√	√			
EB Park & Ride Express	√			√	*	√	*	*	*		*

*Note: East Brunswick Park & Ride Express may use the infrastructure improvements of the Red Alignment if the two are implemented together.

Table 3 summarizes the operating plan for each service recommendation.

Table 3: Summary of Proposed Operating Plan

Alignment	Round Trip Time (min)	Cycle Time (min)	Headways (min)	Vehicles Operated	Vehicle-hours per Year	Revenue-Miles per Year
	Peak/Off-peak	In-Season Peak/Off-Season Peak/Off-Peak	In-Season Peak/Off-Season Peak/Off-peak	In-Season Peak/Off-Season Peak/Off-peak		
Green	86/77	90/90/90	10/15/30	9/6/3	25,200	397,400
Blue	73/66	75/75/90	15/15/30	5/5/3	20,700	252,000
Red	76/68	80/90/90	10/15/30	8/6/3	24,200	316,600
East Brunswick Park & Ride Express*	45/--	60/--/--	30/--/--	2/--	3,000	33,600

*Note: No variation by season; no off-peak service

Each of the four recommended elements is described in the following sections.

4.5.1 Bus Rapid Transit Service on Candidate Start-up Alignments

This element would provide high-quality, convenient, frequent, and reliable Bus Rapid Transit service along one or more of the candidate start-up alignments that were identified in earlier in this summary document. The characteristics of this service would include the following:

Route Design:

- a. Average station stop spacing of approximately 0.4 miles
- b. Span of service extending from 6 AM to 11 PM on weekdays and Saturdays, and from 8 AM to 8 PM on Sundays
- c. Frequency of service of every 10-15 minutes in the peak periods depending on demand and every 30 minutes at other times

Vehicles:

- a. New, stylized, 40-foot, low-floor buses (provided that New Jersey's axle weight restriction can be waived)¹, using either standard clean diesel or hybrid diesel-electric propulsion

¹ The State of New Jersey has restrictions on the maximum permitted axle weight on heavy duty vehicles which may preclude NJ TRANSIT from purchasing certain types of low-floor buses. However, low-floor buses are a key element of BRT to reduce boarding and alighting time. The ability to use most low-floor buses will require a change in the law by the state legislature or a waiver from the New Jersey Motor Vehicle Commission. Although this might take some time to achieve, low-floor buses are a recommended as part of the BRT initiative.

- b. On-board ITS equipment to allow for automatic vehicle location, stop annunciation, real-time arrival information, and automatic passenger counting
- c. Control Center software to support conditional signal priority, real-time information signage and website, and AVL/Computer Aided Dispatching

Stations:

- a. Enhanced passenger amenities and information at stations where there are likely to be waiting customers (i.e., all stations except drop-off locations near the end of a line); these elements would include:
 - 1. Enhanced shelters employing a distinct design consistent with a BRT branding concept
 - 2. Enhanced amenities including illumination, seating, and static customer information including BRT route map and schedule, area map and information on connecting transit services
 - 3. Dynamic message signs with real-time bus arrival information
 - 4. Ticket vending machines to enable off-board fare payment with proof-of-payment inspection (This item may be phased-in after the initial roll-out of the BRT brand.)
- b. A bus station marker or pylon at every station that is consistent with the branding concept
- c. Park-and-ride facilities with adequate parking capacity, station shelters, seating and amenities including a telephone or talk-back system for customer information and security.
- d. Consideration of the potential to create slightly raised curbs at stations to provide level boarding (in combination with the low-floor buses)

Figures 6 through 11 provide examples of the recommended improvements at stations on the candidate start-up BRT alignments.

Figure 6: Example of an Lower-Cost Enhanced Shelter Applicable to GNBA BRT



Figure 7: Example of a Higher-Cost Enhanced Shelter Applicable to GNBA BRT



Figure 8: Example of a BRT Identity Pylon



Figure 9: Example of Real-Time and Static Information at a BRT Station



Figure 10: Example of a Ticket Vending Machine (TVM)



Figure 11: Example of Level Boarding on a BRT System



Priority Elements:

- a. Signal priority and coordination along the BRT corridors in particular at noted intersections to speed buses and provide priority over general traffic.
- b. Traffic engineering improvements to selected intersections (Livingston Avenue & How Lane, Route 27 & Suydam Street, George Street & Commercial Avenue, and George Street & Hamilton Street/Johnson Drive) to speed bus movement
- c. Queue jumpers at North 7th Street & Route 27, Nassau Street & Livingston Avenue and 14th Street & Livingston Avenue; signal priority at these and other selected intersections to reduce delay to BRT buses, with possible application to other buses operating in the corridor
- d. Bus-only connection between Davidson Road and Hoes Lane at the Busch Campus for the Green and Red alignments to provide a quicker, more direct route than is possible today.
- e. Bus only lanes (along with signal priority) and a one-way street pattern as needed on George and Nielson Streets in downtown New Brunswick for the Red alignment to speed bus traffic and to increase the visibility of the BRT service in Downtown New Brunswick.

Figures 12 through 15 provide examples and illustrations of the recommended priority elements on the candidate start-up BRT alignments.

Figure 12: Elements of a Signal Priority System

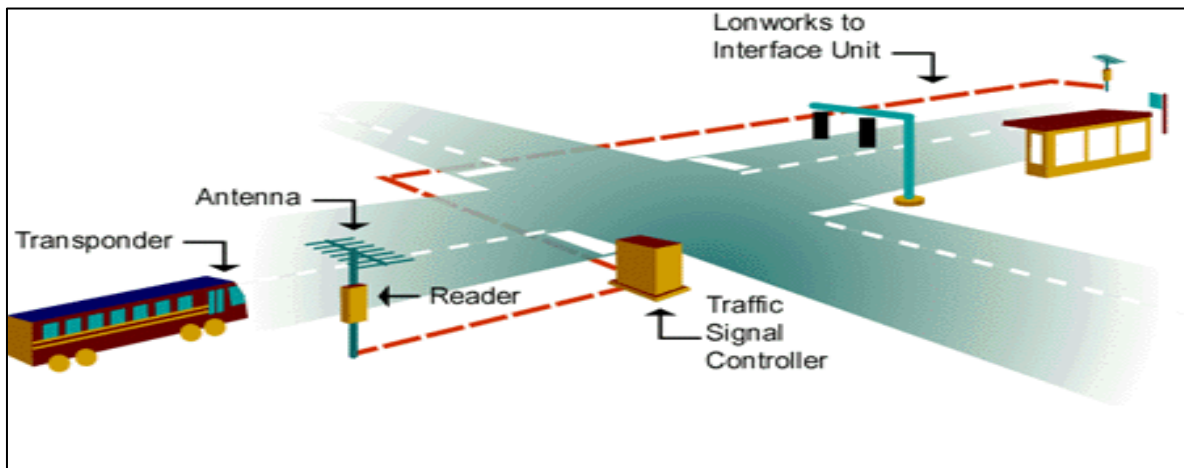


Figure 13: Queue Jumper with Signal Priority

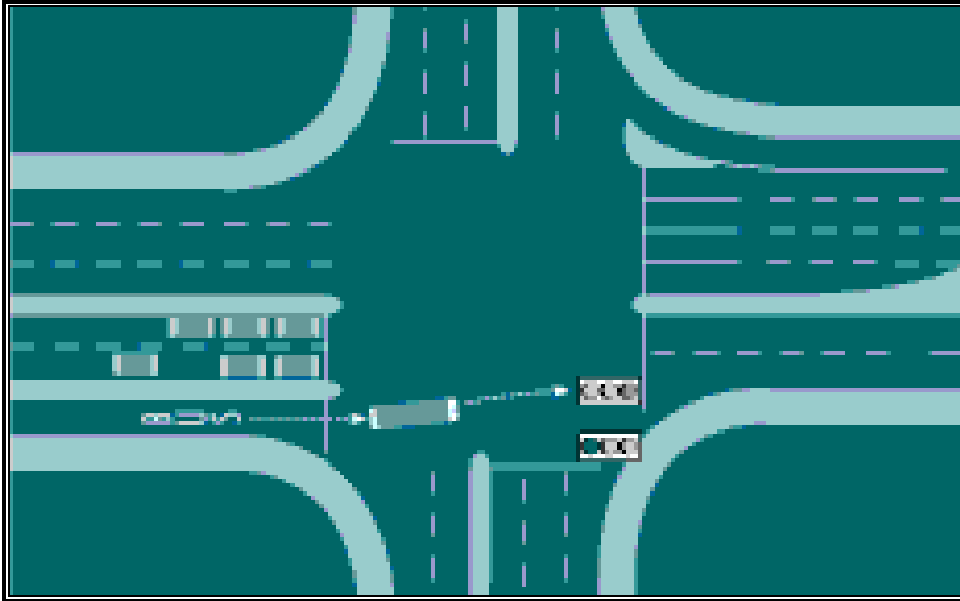


Figure 14: Proposed Bus Only Connection between Hoes Lane and Davidson Road

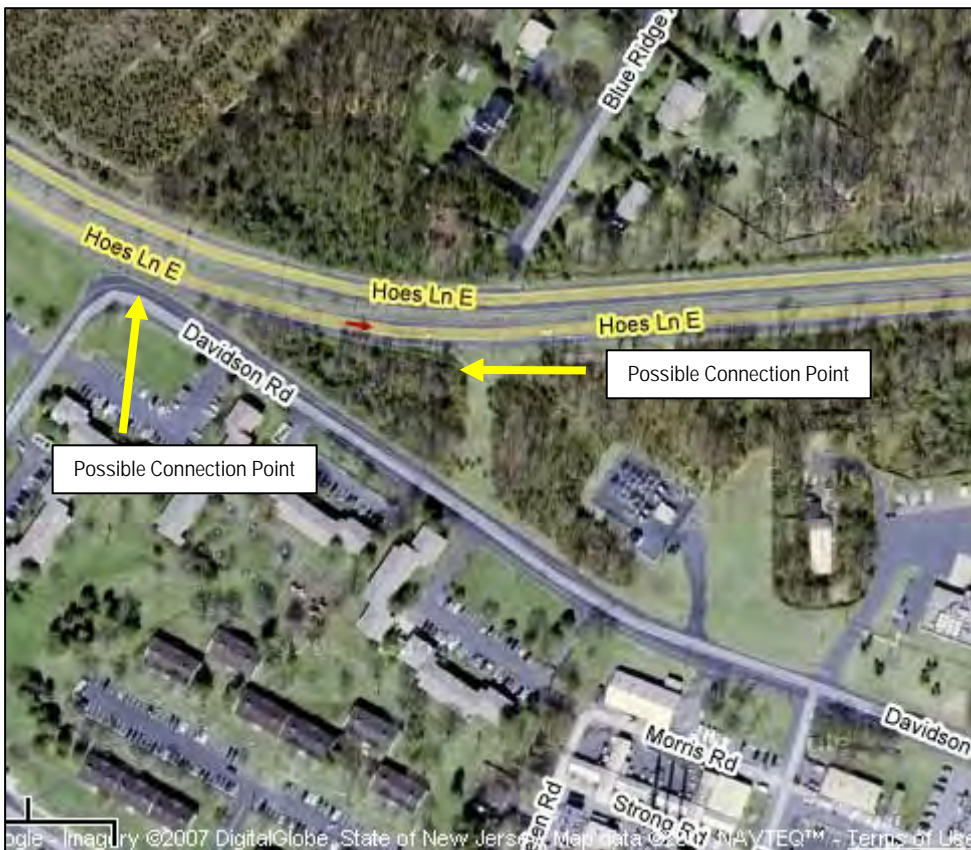


Figure 15: Proposed Bus Lanes on George and Neilson Streets



Branding, Marketing and Policy:

- Development of integration policies with other transit services including fare policy, schedule and service integration that encourages university student, faculty and staff use of the BRT
- Development of supporting policies including a coordinated policy regarding parking fees at park-and-ride lots that takes into account impacts on related services such as parking at rail stations, downtown parking and institutional parking and greater employer support of transit use
- Branding and Marketing program including a distinct name, logo, color scheme, livery, etc. and a user information campaign
- Development of partnership agreements with key stakeholders to enable cost-effective operation of the BRT
- Development of a phased approach to implementation that allows some immediate improvements, a major roll-out of the BRT brand and subsequent phase-in of features that may require more lead time or capital expenditure
- Evaluation of the start-up alignment performance and effectiveness and updating of an expansion plan based on the three candidate start-up alignments and the longer term vision for BRT in the Greater New Brunswick Area which includes alignment extensions and new corridors

4.5.2 East Brunswick Park-and-Ride Express Bus Service

This element would provide a convenient, commuter-oriented express bus service between downtown New Brunswick and a Park & Ride facility in East Brunswick. The characteristics of this service would include the following:

- a. Operation in the Peak Period and Peak Direction on weekdays every 30 minutes, using 40-foot, low-floor buses
- b. A Park-and-Ride facility at either the East Brunswick Transportation Center (additional structured parking) or a new surface lot at Harts Lane, as well as at a potential shared lot at Ryders Lane near Route 1
- c. Several drop-off locations in Downtown New Brunswick, and a stop at the Cook-Douglas Campus of Rutgers University

4.5.3 Route 27 Southwest Infrastructure Improvements

This element would provide targeted infrastructure improvements along Route 27 to the southwest of downtown New Brunswick to support existing private bus services in the corridor. These improvements would include the following:

- a. Signal optimization, progression and priority at How Lane/Veronica Avenue, Bennetts Lane and Cozzens Lane to speed private bus carriers along this corridor.
- b. Intersection improvements including better channelization and lane markings to extend the turning lanes at Bennetts Lane and Cozzens Lane
- c. Installing signal priority emitters for Coach USA/Suburban Transit buses operating in the corridor
- d. Bus shelters (about ten in total) located at heavily patronized bus stops in the inbound direction and at the new New Brunswick High School in the outbound direction
- e. Consideration of off-board ticketing possibilities at locations with high demand

4.5.4 Improvements at the New Brunswick Railroad Station

This element would include a variety of improvements to the vehicular, pedestrian, and bicycle circulation around at and around the New Brunswick Railroad Station. These improvements would include the following:

- a. Enhanced Customer Information (Figure 16)
 1. Passenger information centers (four) within the station (providing static route and schedule information, customer service notices, provider contact information). The intent is to provide “one stop shopping” by listing the information for all transportation service providers at these centralized locations. An important component is to ensure that these information directories are kept up to date as service information changes.
 2. Interior and exterior wayfinding signage at the station

-
3. Wayfinding signage for both motorists/cyclists and a separate signage system for pedestrians to guide them to (and from) New Brunswick Station from nearby areas surrounding the station.
- b. Vehicular Accommodations (Figures 16, 17, and 19)
 1. Pavement markings and curb cuts to create small pick-up/drop-off areas at locations around the station; these may include both sides of George Street at the north end of the station, and on Easton Avenue, if this location is deemed safe enough to accommodate such a pick-up/drop-off area
 2. Taxi stand on Somerset Street in front of the Gateway Center or within the Gateway Center Garage
 - c. Pedestrian Accommodations (Figures 16, 17A, 17B, and 20)
 1. Pedestrian countdown signals at the intersections of Albany Street with George Street and Easton Avenue
 2. High visibility crosswalks and pedestrian activated “yield to pedestrian” flashing signage at six locations including the Albany Street & Easton Avenue intersection, Albany Street & George Street, George Street midblock near the eastbound platform, Somerset Street & George Street, Wall Street & Somerset Street, Wall Street & George Street; the midblock crossing on George Street near the eastbound platform would also be straightened to be perpendicular to the street
 3. Examine the feasibility during the AM peak period of an all-pedestrian phase at the Albany Street and Easton Avenue intersection activated by the train arrival at the station
 4. A new median on Albany Street that prevents mid-block pedestrian crossings
 5. Increase police enforcement
 6. Reinforcing the role of the proposed new pedestrian only walkway ramp from the Trenton bound platform to Somerset Street, and adding a “landmark” or “gateway” element to signify the importance of this new pedestrian linkage. Ideally, this pedestrian walkway would be canopied to provide a sheltered walkway during inclement weather.
 - d. Bicycle Accommodations (Figures 17B and 20)
 1. Bicycle lockers and bike racks in the northwestern corner of the station including a mini-bike storage area, coordinated with and potentially incorporated into the Gateway Center parking garage.
 2. Develop a shared-use bike way along with Share the Road signage along Albany Street and along George Street in the vicinity of the station and beyond, if feasible
 3. Integrate these improvements with bicycle storage and related bicycle lane projects in the vicinity of the station (being undertaken by KMM and Middlesex County)
 - e. Transit Facility Enhancements (Figures 16, 17B, and 18)
 1. A canopied bus transfer center to accommodate 3-5 bus bays, located on the north side of the station along the south side of Somerset Street; the specific location suggested by the Consultant Team is adjacent to the landing of the new pedestrian ramp (leading to the Trenton bound platform) proposed as part of the Gateway Center;

this location is appealing in terms of operations and visibility but requires further review and discussion with stakeholders and abutters.

2. An enhanced bus stop with a shelter and signage on westbound Albany Street, on the near side of Washington Street, and a similar stop on the eastbound side (these would become BRT stations if either the Green or Blue start-up BRT alignment was implemented)
4. A BRT station with shelters and signage on northbound and southbound George Street near the eastbound end of the platform (if either the Green, Blue or Red start-up BRT alignment was implemented)
5. Extension of the Trenton bound platform (currently under study and design by NJ TRANSIT) with new, direct connections to the proposed stem cell research center at the west end of the extended platform.
6. Mid-platform shelters for rail passengers
7. Embankment tunnel improvements (including architectural treatments, lighting and security cameras)
8. Platform exit improvements at the north end of the station
9. Expanded, climate-controlled, westbound platform waiting area integrated into the Gateway Center at the ramp gateway level with transportation directory and ticket vending

Figures 16 through 20 show the recommended improvements at New Brunswick Station.

Figure 16: New Brunswick Station Area In-Station Pedestrian/Passenger Improvements and Information/Wayfinding Improvements

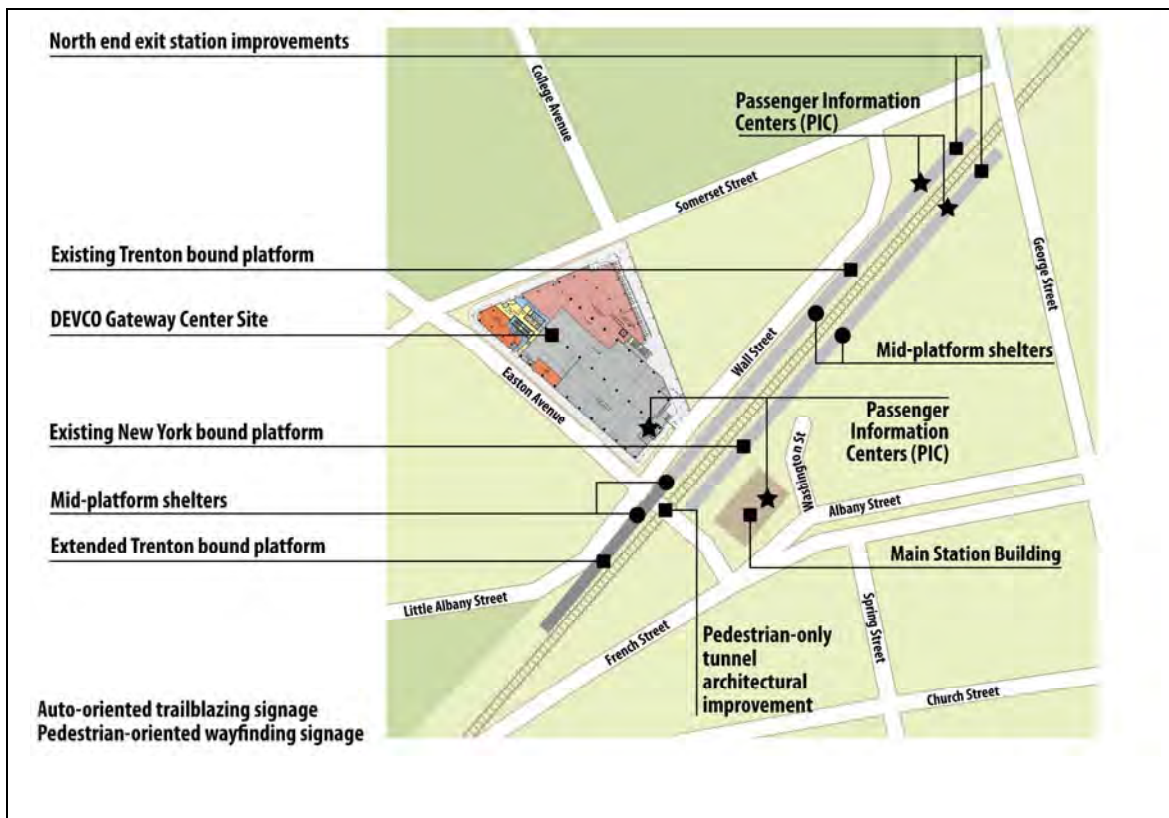


Figure 17A: DEVCO Gateway Center as Proposed

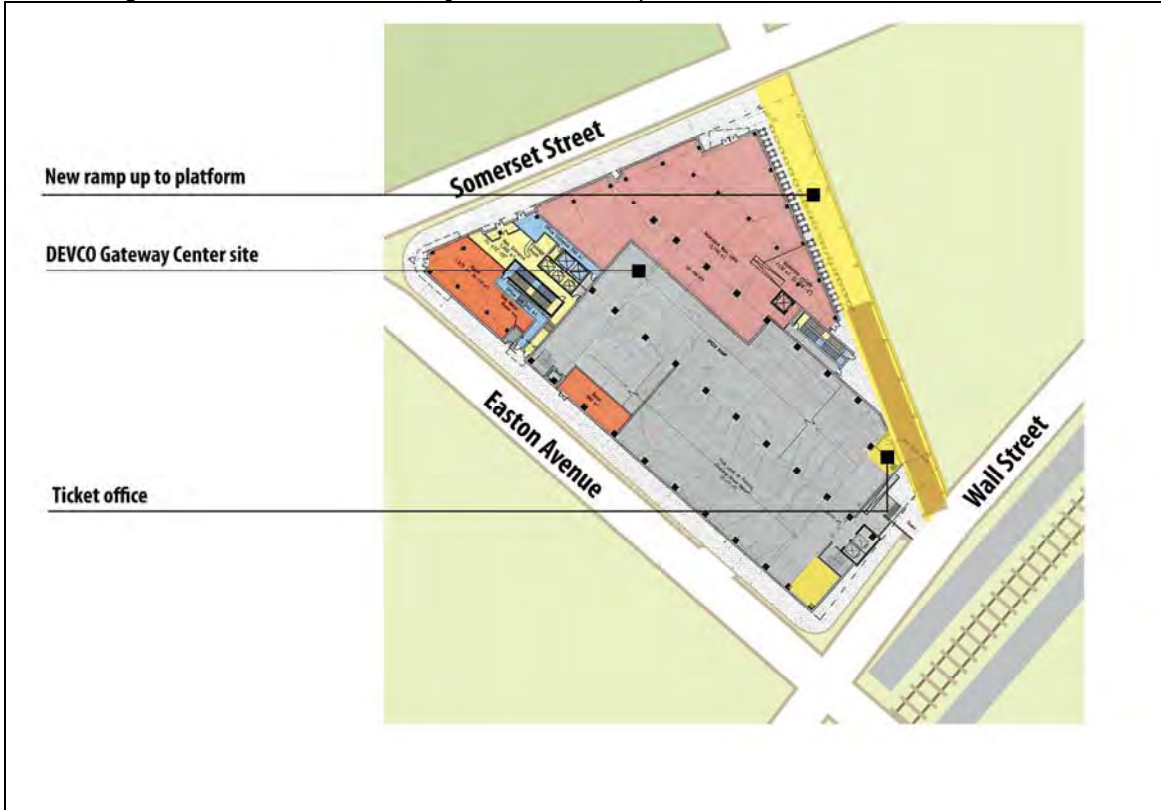


Figure 17B: Additional Recommended Improvements at the DEVCO Gateway Center

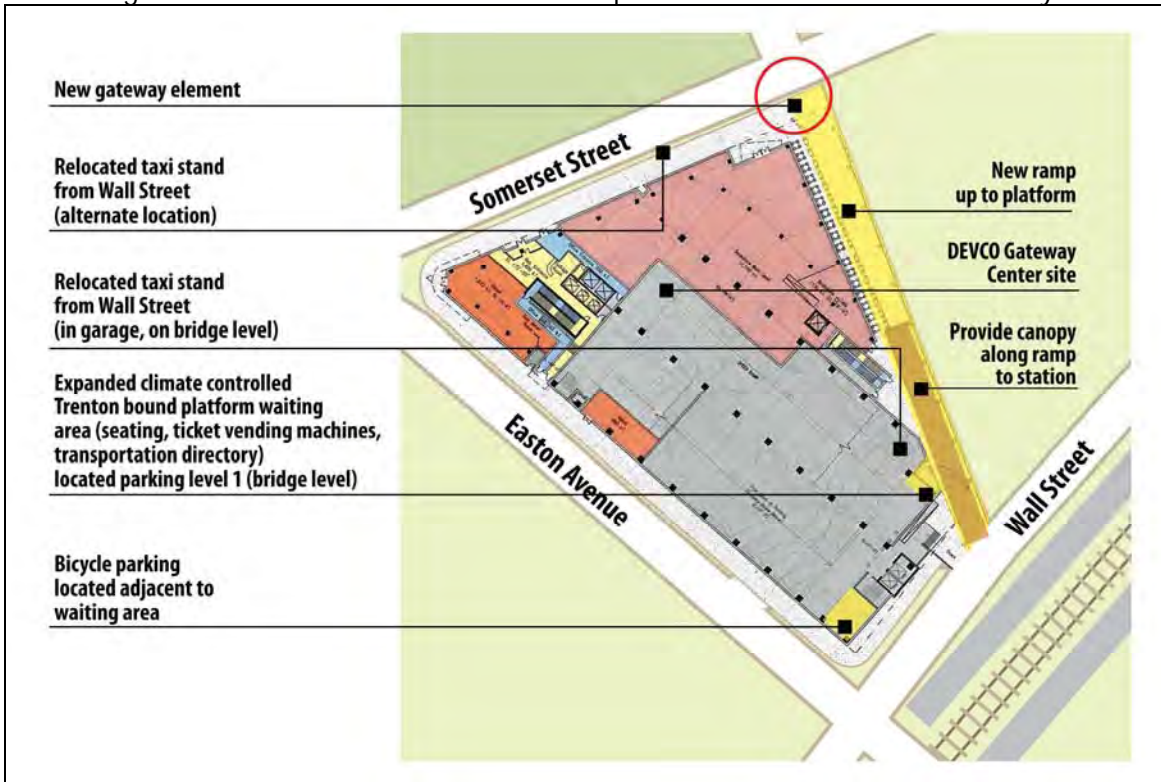


Figure 18: New Brunswick Station Area Bus Transit Improvements

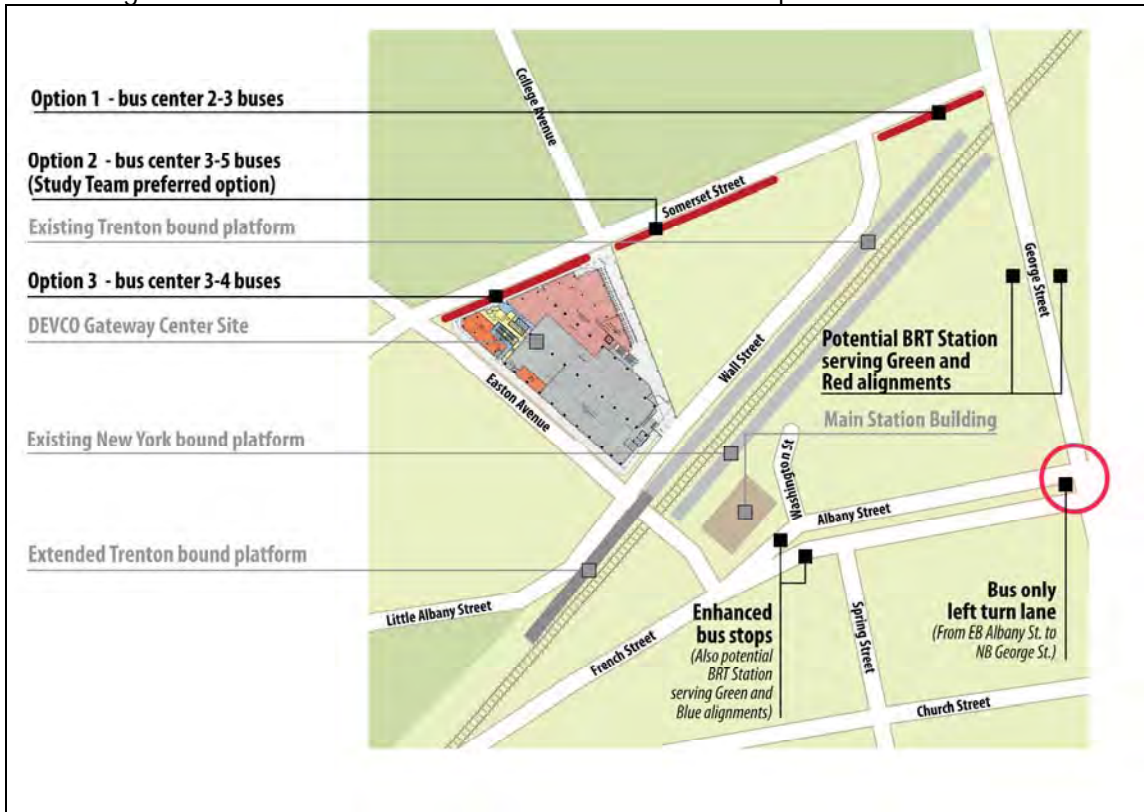


Figure 19: New Brunswick Station Area Pick-Up/Drop-Off Area Improvements

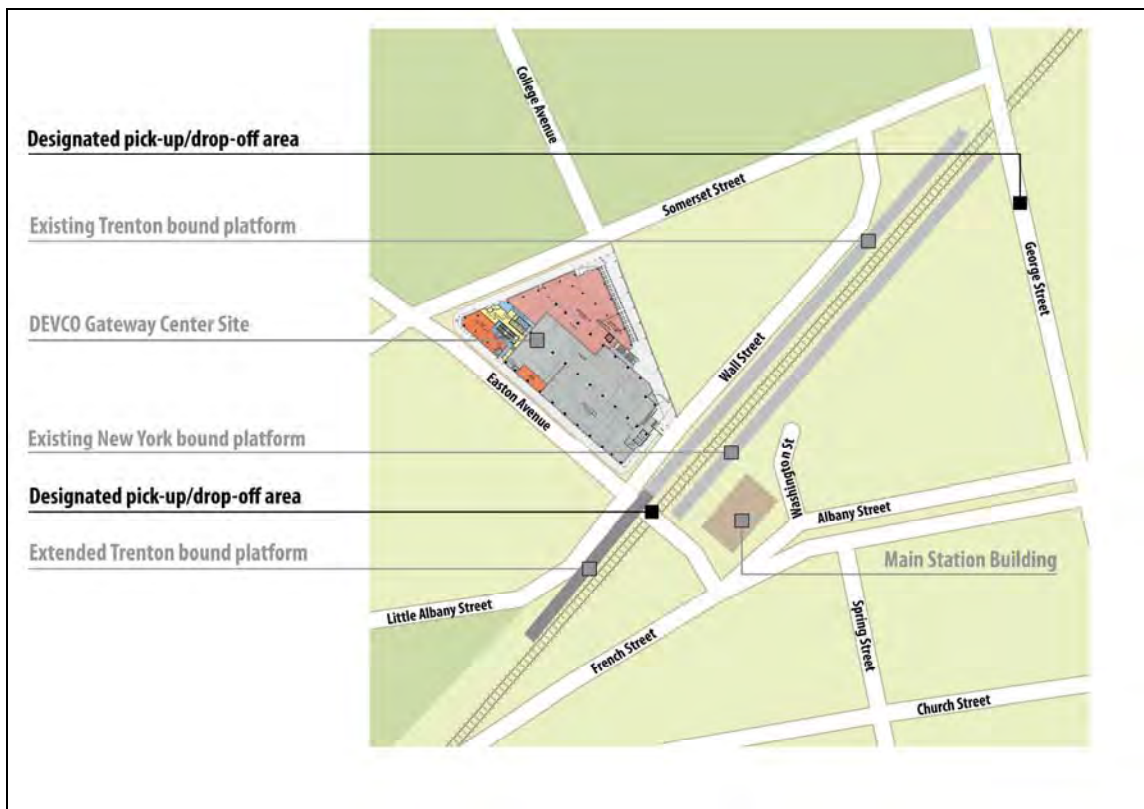
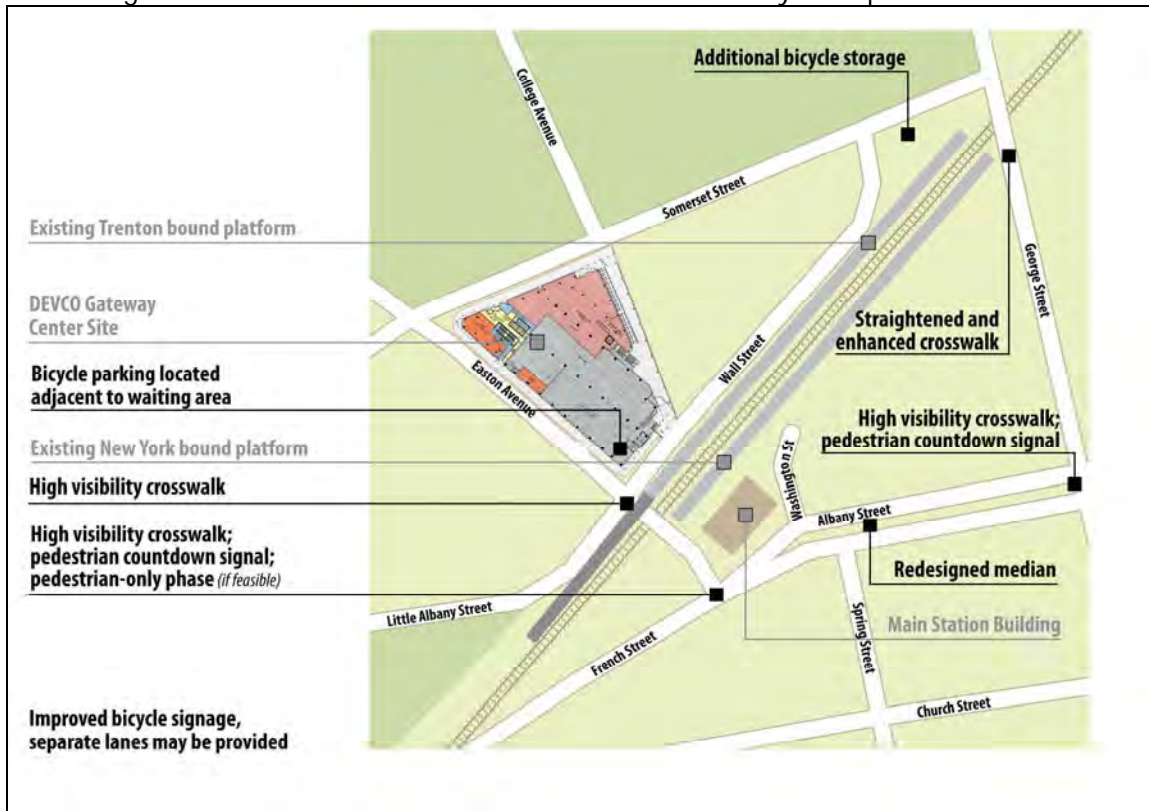


Figure 20: New Brunswick Station Area Pedestrian/Bicycle Improvements



5. Costs and Impact Evaluation

This section describes the conceptual capital and operating costs, the ridership and revenue estimates and the net operating subsidy associated with recommended improvements. These estimates are order-of-magnitude estimates in 2007 dollars.

5.1 Capital Costs

Order-of-magnitude capital cost estimates were prepared for the corridor improvements and the New Brunswick Station improvements, as shown in Tables 4 and 5 respectively. These estimates exclude any land/right-of-way and environmental mitigation costs (where applicable).

Table 4: Conceptual Capital Cost Estimates for the Startup BRT Alignments and Other Corridor Improvements (2007 dollars)

Alignment or Improvement	Total Capital Cost Low End Estimate	Total Capital Cost High End Estimate	Total Capital Cost Midpoint Estimate
Green BRT	\$12,400,000	\$19,100,000	\$15,750,000
Blue BRT	\$ 8,300,000	\$14,200,000	\$ 11,250,000
Red BRT	\$12,600,000	\$19,200,000	\$15,900,000
EB Park & Ride Express	\$ 1,800,000	\$ 9,000,000	\$ 5,400,000
Route 27 Southwest Infrastructure	\$ 330,000	\$ 470,000	\$400,000

Table 5: Order of Magnitude Capital Costs for New Brunswick Station Improvements: Breakdown by Item (2007 dollars)

Item	Low End	High End
Station Area Pedestrian/Bicycle Improvements	\$154,000	\$154,000
Bicycle Lanes to Station	Not estimated*	Not estimated*
Easton Ave./Albany St. Activated Signal	\$1,000	\$10,000
Pick-up/Drop-Off Area Improvements	\$4,000	\$4,000
Platform Extension Improvements	Not estimated**	Not estimated**
Wayfinding Signage	\$227,000	\$298,000
Transportation Directories/Passenger Information Centers (4)	\$10,000	\$20,000
In-Station Passenger and Pedestrian Improvements	\$500,000	\$580,000
Bus Transfer Center/Bus Stops	\$379,000	\$731,000
TOTAL (excluding contingency and design allowances)	\$1,275,000	\$1,797,000

* These improvements are part of the Middlesex County Bicycle Planning effort.

** These improvements are part of NJ TRANSIT's Liberty Corridor Improvements and are being planned in a separate study effort.

5.2 Ridership

Ridership estimates were prepared in ranges reflecting the uncertainty that is associated with the sketch planning methods used in this study. Table 6 shows the results including a low end and high end estimate.

Table 6: Conceptual Ridership Estimates for the BRT Startup System

Service/Alignment	Projected Weekday Ridership During Rutgers Session (boardings/day)		Projected Annual Ridership* (boardings/year)	
	Low End	High End	Low End	High End
BRT - Green	2,800	4,500	726,900	1,165,000
BRT - Blue	1,400	3,300	405,500	965,300
BRT - Red	3,300	4,300	808,300	1,033,600
East Brunswick Park & Ride Express	270	530	67,300	134,600

* Annualized ridership numbers adjusted to factor for semester variations in student ridership.

Based on the midpoint of these ridership estimates, the productivity of the services was estimated, as shown below in Table 7.

Table 7: Estimated Productivity of Each BRT Alignment

Based on Midpoint	Productivity (Passengers Per Vehicle-Hour)		
	Green BRT	Blue BRT	Red BRT
Peak period in-season	40	47	48
Weekday in-season	42	37	47
Average day of year	38	33	38

Note: Each corridor estimated independently; not additive

The estimated productivity of the East Brunswick Park-and-Ride Express Service based on the midpoint ridership estimate is 33 boardings per vehicle-hour.

5.3 Operating Costs, Revenue and Net Operating Cost

Table 8: Conceptual O&M Cost Estimates for the Startup BRT System and Other Corridor Improvements (2007 dollars, midpoint estimate)

Alignment or Improvement	Annual Vehicle Operations Costs	Other Annual Costs	Total Annual O&M Cost
Green BRT	\$1,271,600	\$838,400	\$2,110,000
Blue BRT	\$ 918,800	\$731,200	\$1,650,000
Red BRT	\$1,110,900	\$799,100	\$1,910,000
East Brunswick Park & Ride Express	\$ 128,600	\$ 61,400	\$ 190,000
Route 27 Southwest Infrastructure	NA	\$ 22,000	\$ 22,000

Fare revenue was estimated assuming fares consistent with existing NJ TRANSIT bus routes and assuming that students diverted from RUDOTS routes would also generate revenues consistent with average fares (while also assuming that students would not experience out-of-pocket fares so that there would be no disadvantage to using the BRT vs. the free RUDOTS bus services). All revenues are in 2007 dollars and are order-of-magnitude.

Table 9: Annual Fare Revenue Estimates (2007 dollars)

Alignment or Improvement	Annual Fare Revenue (based on Low End Ridership)	Annual Fare Revenue (based on High End Ridership)
Green BRT	\$740,000	\$1,160,000
Blue BRT	\$410,000	\$960,000
Red BRT	\$820,000	\$1,030,000
East Brunswick Park & Ride Express	\$70,000	\$130,000

The net operating subsidy, farebox recovery and net operating subsidy per rider are shown in Table 10.

Table 10: Net Operating Subsidy and Farebox Recovery (2007 dollars)

Green Alignment				
	Annual operating cost (midpoint)	Annual fare revenue	Net operating subsidy	Farebox recovery
Low End Ridership	\$ 2,110,000	\$ 740,000	\$ 1,370,000	35%
High End Ridership	\$ 2,110,000	\$ 1,160,000	\$ 950,000	55%

Blue Alignment				
	Annual operating cost (midpoint)	Annual fare revenue	Net operating subsidy	Farebox recovery
Low End Ridership	\$ 1,650,000	\$410,000	\$ 1,240,000	25%
High End Ridership	\$ 1,650,000	\$960,000	\$ 690,000	58%

Red Alignment				
	Annual operating cost (midpoint)	Annual fare revenue	Net operating subsidy	Farebox recovery
Low End Ridership	\$ 1,910,000	\$820,000	\$ 1,090,000	43%
High End Ridership	\$ 1,910,000	\$1,030,000	\$ 880,000	54%

East Brunswick Park & Ride Express				
	Annual operating cost (midpoint)	Annual fare revenue	Net operating subsidy	Farebox recovery
Low End Ridership	\$ 190,000	\$70,000	\$ 120,000	37%
High End Ridership	\$ 190,000	\$130,000	\$ 60,000	68%

The next section addresses potential prioritization and phasing of the recommendations.

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6. Prioritization and Phasing

The recommended improvements could be implemented all at once if budgets permitted but are more likely to be phased. As a result, each major improvement was developed as a separate recommendation, that is, the cost and ridership estimates did not assume any other recommendation was implemented. As a result, the three BRT alignments can be considered as alternatives for an initial start-up of BRT in the Greater New Brunswick Area. If a second or third BRT alignment was added in a subsequent phase, the cost for implementation would be reduced wherever there are shared elements such as shared stations or ITS central software, for example. Of course, adjustments to costs for a subsequent phase would need to take into account changes (usually increases) in the unit costs over the time lapse since the initial phase. Note that since all costs were estimated in 2007 dollars, adjustments would be needed for any future year implementation date. Similarly, the ridership estimates of a phased implementation would need adjustments to take into account any double counting of ridership where the alignments overlap as well as any synergistic effect on ridership where the alignments complement each other. As in the case of the costs, the ridership would also need to be adjusted to reflect growth between the 2007 base year and any future year implementation.

The Core Stakeholder Group preferred that Phase 1 not attempt to prioritize among the three BRT alignments but rather present the characteristics, costs and ridership of each alignment noting any particular advantages and disadvantages of each. However, unless all three alignments can be implemented at once, the next phase will need to address how to prioritize the alignments. This prioritization could take into account a number of factors, such as:

1. Total capital cost
2. Annual capitalized cost plus operating cost
3. Total ridership projected
4. Sources of ridership and ability to serve new or target markets
5. Cost-effectiveness measures such as net cost per rider
6. Ease of implementation
7. Potential partnerships that could enhance any of the above measures

The information provided in the Phase 1 Final Report should facilitate the continued review of the options by NJ TRANSIT, NJTPA, key stakeholders and the public to advance into a second phase of study.

Another aspect of phasing is the potential introduction of specific improvement elements in advance of a full implementation of a BRT service on any alignment. BRT can be implemented in a phased manner and many of the BRT elements can be implemented individually. To be introduced as a BRT premium, branded service, we would recommend implementing most if not all the recommended elements. Some elements could be introduced in advance however.

Thus, NJ TRANSIT and NJTPA may be faced with three basic options for BRT implementation on the start-up corridor(s) in the Greater New Brunswick Area. Option 1 is to implement all the

elements of its concept of BRT at once. Option 2 is to phase in BRT with some elements implemented in advance of a BRT brand, most elements as part of the BRT brand roll-out and some elements delayed until a later phase. Finally, Option 3 is to decide not to implement BRT per se but to use this study to identify certain improvements to be implemented in the Greater New Brunswick Area. If Option 3 is chosen, virtually any element could be implemented, except for the BRT branding. That doesn't mean that branding strategies could not be used. The Washington Metropolitan Area Transit Authority (WMATA) recently chose to implement a branded, enhanced bus service with the name MetroExtra since the service did not have the features of BRT but was considered sufficiently enhanced to merit branding.

Within the proposed BRT alignment corridors, many of the improvements to bus service could be made in advance of BRT, however if Option 2 is chosen and BRT implementation is contemplated in a reasonably short time frame, we would suggest that most of the key BRT elements be reserved for implementation with the introduction of the BRT brand. Therefore we would recommend consideration of only the following as early improvements prior to the roll-out of the BRT brand:

- Low floor buses
- Signal optimization and progression and possible some signal priority
- Improved information at bus stops
- Development of policies supportive of transit use
- Development of enhanced integration among transit services

Improvements that could be phased-in after the roll-out of the BRT brand include:

- Ticket vending machines for off-board fare payment – Note that on-board payment and single door boarding will increase dwell time somewhat at the stops and affect the travel time benefits and the operating plan and cost.
- Low floor (and stylized) buses – if a waiver of the axle weight requirement cannot be achieved, the service could be implemented with high-floor buses, however it would impact dwell time, travel time benefits, the operating plan and operating cost. A unique paint scheme or wrap on the bus could achieve some of the branding benefits of a stylized bus.
- Level boarding through the use of raised curbs at stations
- *It should be noted that the combination of delaying off-board fare payment and low floor buses would have an even larger impact on travel time.*

Certainly improvements to the New Brunswick Station Area need not await the implementation of BRT, although any bus stop area improvements should be implemented taking into account the potential station locations of a subsequent BRT implementation. Similarly, the introduction of a park-and-ride express bus service from East Brunswick and minor infrastructure improvements on the Route 27 southwestern corridor need not await the implementation of BRT on the 3 proposed alignments.

7. Marketing and Policy Recommendations

7.1 Marketing Strategies

Marketing strategies were evaluated and recommended based on their applicability to the proposed Greater New Brunswick Area Bus Rapid Transit system. These strategies were culled from a literature review and experiences in other markets promoting transit use and BRT systems. Marketing concepts were also reviewed and refined through a series of a series of leadership interviews with key stakeholders in the Greater New Brunswick Area.

Targeted Marketing Strategies that have been identified in relation to the proposed GNBA BRT system include:

- Key employers in the region should be provided with educational materials on Transportation Demand Management (TDM) strategies. Keep Middlesex Moving (KMM) can help in informing employers of transportation opportunities in the region and benefits that can be offered to employees (For example, the opportunity of providing TransitChek to employees).
- Social Service agencies in the region should be partnered with in an effort to market to underserved populations that are a key target market for ridership.
- Cooperative promotions with the private sector should be pursued for promoting transit service.
- Any future BRT system should be marketed for specific travel needs, such as students who patronize retail establishments along the Stelton Road and Centennial Avenue corridors, area residents utilizing New Brunswick Station, fans attending Rutgers football and basketball games, and theatergoers patronizing downtown New Brunswick's theaters.
- Current and future stops and stations need clear and concise educational/marketing materials developed that explain transit system use and scheduling.
- Marketing materials and signage should be bilingual and should accommodate people with visual or hearing impairments.
- The environmental benefits of using transit and any "green" strategies used in the development of the system should be a part of a "green" marketing strategy.

7.2 Policy Recommendations

As part of the review of marketing and policy initiatives in the Greater New Brunswick Area, a series of leadership interviews with key stakeholders was undertaken to gather insight into the existing policy framework. The interviews helped profile existing land uses, policies, and conditions that frame transportation mode choices in the GNBA region. Interview questions focused around work force characteristics, parking policies and needs, transit use, and TDM policies.

Key policies that have been identified in relation to the proposed GNBA BRT system include:

- NJ TRANSIT should consider developing a policy that allows monthly rail pass holders to use their pass to ride the BRT system without charge.

-
- Rutgers University and New Jersey transit should coordinate on the development of a fare pricing program that would allow for transfers between the Rutgers University bus system and New Jersey Transit bus and rail.
 - Park & rides have been proposed at the ends of the conceptual GNBA BRT alignments. These park & rides need to be prominently promoted and have adequate wayfinding signage placed on major roadways in the area. Marketing materials should be developed to promote the availability of the park and rides and materials should be distributed to key stakeholders in the region.
 - Parking policies, supply and pricing should be investigated by the New Brunswick Parking Authority (NBPA), City of New Brunswick, Middlesex County and Rutgers University. Metered parking pricing as well as the pricing of parking decks should be considered and adjusted in relation to demand. Market-based parking pricing will discourage SOV trips and encourage transit use. Additionally, parking providers should consider an electronic payment medium for its garages and meters that would be compatible with an electronic fare payment system, if implemented, for the BRT system.
 - Municipalities in the GNBA region should be monitored for key development and redevelopment in the area that could be served by the conceptual BRT system. The potential for infill, TOD development and transit supportive planning and zoning should be coordinated with any future BRT system development.
 - Rutgers University should be engaged in a discussion of the potential for a coordinated TDM program focused around potential synergies between existing transportation services (R.U. bus system, local shuttle system, bus routes, light rail transfers) and future service (conceptual GNBA BRT system, New Brunswick station service, etc). Route planning and operations should also be examined for service synergies.

8. Stakeholder Involvement Process

An ongoing stakeholder involvement process was employed to obtain input from the public about needs in the study area and feedback on study findings and preliminary recommendations. At the project kick-off meeting, the following objectives were developed for the stakeholder involvement process:

- Establish ongoing, inclusive and meaningful two-way communication with stakeholders and agencies;
- Coordinate outreach efforts;
- Evaluate the effectiveness of outreach activities on a continual basis in order to refine the public involvement plan as necessary, and utilize the most effective techniques throughout this study to build consensus and support from elected and public officials, affected employers, developers, institutions, and local advocacy groups;
- Determine what is best for the Greater New Brunswick Area; and
- Understand stakeholder priorities and desired outcomes.

It was decided that the study would be guided on an ongoing basis by a Core Stakeholder Group and that broader stakeholder outreach would be incorporated at selected points in time. These two aspects of stakeholder involvement are described below:

8.1 Core Stakeholder Group

A Core Group of Stakeholders was established to guide the study. The group met six times over the course of the study to review progress and provide input. The Core Group included the representatives listed in Table 11.

Table 11: Core Group of Stakeholders

Organization	Name
NJ TRANSIT (Co-Funding Agency)	R.J. Palladino (Project Manager), Jim Gilligan, Alan Maiman, Jack Kanarek, Tom Clark
North Jersey Transportation Planning Authority (Co-Funding Agency)	Ron Tindall, Jeff Vernick
New Jersey Department of Transportation	Monica Etz
Rutgers Department of Transportation Services	Jack Molenaar, Jennifer Lane, John Karakoglu, Vincent Riscica
National Transit Institute	Paul Larrousse
Middlesex County	Tony Gambilonghi, George Ververides, Steve Fittante
Township of Piscataway	Dawn Corcoran
City of New Brunswick	Gail Yazersky, Johane Clermont
City of New Brunswick Mayor's Office	Chris Butler
Keep Middlesex Moving	Bill Neary
Voorhees Transportation Center (VTC)	Martin Robins, Jon Carnegie, Ranjit Walia, Pat Ballard Fox, Matt Ellis, Brian Staples, Andrew Besold, Elizabeth Thompson

Six meetings were conducted with the Core Group over the course of the study, the first meeting in February 2007 and the last in December 2007. The Core Group was also included in the final Stakeholder Group meeting in February 2008. The appendix contains minutes of the Core Group meetings documenting comments and input provided at each meeting.

8.2 Expanded Stakeholder Group

Two meetings were held with an expanded group of stakeholders. The first was held early on June 20, 2007, several months after the study was initiated. The purpose of the meeting was to introduce the project to the stakeholders and obtain early input. The study team described the study area and goals, and then what BRT is and how it could work in New Brunswick. The remainder of the meeting was dedicated to a questions and answers. The key topics of discussion included issues with the existing bus service, communication with stakeholders and employers, the relationship of the GNBA BRT study to other planning efforts, and possible improvements to consider in the study.

The second was held on February 6, 2008 to share the findings and recommendations of the Greater New Brunswick Area Bus Rapid Transit Study. This meeting included the core stakeholders as well as the expanded group of stakeholders. The meeting was divided into three main parts: (1) a brief review of the BRT study findings and recommendations, (2) a summary of the proposed New Brunswick Rail Station improvements, and (3) a discussion of next steps. Following each part of the meeting was a discussion period in which the group had a chance to ask questions, voice concerns, and give suggestions.

The key topics of discussion in the first part of the meeting included what the fares and fare policy on the BRT system might be, how the improvements might be funded and what actions could be taken to get it started, suggestions for further coordination between the project sponsors and stakeholders such as DEVCO, and suggestions for continued coordination with other transit and bicycle planning efforts. The discussion topics in the second part of the meeting included information to be provided at the proposed transit information centers, other pedestrian improvements that may be needed around the station, emergency vehicle considerations at the proposed pick-up/drop-off area, possible longer-term improvements to the station platforms, and possible public-private partnerships to staff the proposed information center at the station. In the third part of the meeting, NJ TRANSIT presented the next steps in the planning and implementation process that it had identified. These are discussed in Section 9 of this document.

The Expanded Stakeholder Group included members of the Core Group and the additional individuals listed in Table 12.

Table 12: Expanded Group of Stakeholders*

Organization	Name
Keep Middlesex Moving	Morteza Ansari
New Brunswick Development Corp (DEVCO)	Josh Ashcraft
Telcordia Technology	Deborah Bennett
UMDNJ	Joe Bernasz
New Brunswick Adult Learning Center	Scott Bollwage
Robert Wood Johnson University Hospital	Doug Campbell
UMDNJ	Cory Cuneo
University Behavioral Healthcare	Brandi Davison
UMDNJ-Logistical Services	Matthew Dekok
Middlesex County Courts	Wayne Fiorino
Township of Edison	Brandy Forbes
Puerto Rican Action Board	Julio Garcia
United Way of Central New Jersey	Stuart Grant
State Theater	Dave Hartkern
Franklin Township	Mark Healey
New Brunswick Parking Authority	Mitchell Karon
Somerset County	Walter Lane
UMDNJ	Brian Mahon
Johnson & Johnson Security	Frank Marrero
Robert Wood Johnson University Hospital	Kevin McTernan
DEVCO	Josh Outell
Middlesex County College	Susan Perkins
St. Peters University Hospital	Robert Reyes
Middlesex County College	Evelyn J. Rosa
New Brunswick Adult Learning Center	Patricia Ruggeri
UMDNJ - School of Public Health	Melanie Smith-Pasternak
First Baptist Community Development Corp	Elizabeth Strong
Johnson & Johnson	Landon Turner
New Brunswick Development Corp (DEVCO)	Don Quinn
First Baptist Community Development Corp	Cathy Waters

*Note: This table lists individuals who signed in at the expanded stakeholder group meetings, in addition to the members of the Core Group (who also may have attended).

At the second meeting of the expanded stakeholder group, NJ TRANSIT distributed a two-page fact sheet about the GNBA BRT study created by the study team. This fact sheet discussed the study, the concept of BRT, BRT elements, why BRT might be a good fit for the Greater New Brunswick Area, intermodal connections at New Brunswick Station, where BRT could operate, and next steps. The fact sheet also included contact information for R.J. Palladino at NJ TRANSIT so interested individuals could find out more about the study.

In addition to the above stakeholder involvement, Voorhees Transportation Center conducted interviews with key stakeholders to obtain input on the policy issues and potential marketing strategies associated with Bus Rapid Transit in the Greater New Brunswick Area.



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9. Next Steps

There are a number of unresolved issues that need to be further explored in the next phase of study. These include:

1. Is there sufficient financial, political, community and institutional support to advance BRT?
2. Does BRT compare well in terms of cost-effectiveness with other transit investments being considered in the state and region?
3. Which alignment of BRT should be advanced to implementation?
4. Is more study of market demand needed to evaluate the candidate alternatives?
5. Should incremental improvements be made before advancing the full BRT start-up project on any of the candidate alignments?
6. Are there partners for one or more of the recommended improvements that will work with NJ TRANSIT to sponsor this project?
7. Who would operate the proposed service? Are some operating alternatives more advantageous in reducing costs and enhancing benefits than others?
8. Which supporting policies and marketing strategies need further development to make BRT successful?

To address these unresolved issues, the following are recommended by the study team as next steps:

1. Conduct more extensive public outreach including general public open houses and discussions with key stakeholders; up to this point, the general public and the broader Rutgers community have not been closely involved in the planning process
2. Conduct high level discussions with potential partners to identify partnering opportunities, including potential capital contributions, operating funding sources, and/or subsidy contributions
3. Examine ridership demand using an updated and refined regional demand model
4. Consider the impact of fare and parking policies on ridership and revenue
5. Further refine the estimates of capital costs
6. Examine the cost-effectiveness of an implementation in 2010 and/or 2015 taking into account both projected growth and year-of-expenditure costs
7. Examine alternative operator scenarios and the impact on costs and revenues
8. Reach consensus on a single start-up alignment
9. Identify immediate actions that can be pursued right away including non-BRT improvements in corridors, improvements at the New Brunswick Railroad Station, and changes in bus axle weight restrictions
10. Refine designs for infrastructure, including developing a new "NJ TRANSIT house design" for new BRT stations.

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11. Pursue an axle weight restriction waiver for buses in the New Jersey legislature
 12. Develop an action plan for implementation

At the Expanded Stakeholder Group meeting for the project held on February 6, 2008, NJ TRANSIT presented the next steps in the planning and implementation process that it had identified. These included the following:

1. Immediate action items, including bus stop improvements at key locations around the area and information and bicycle accommodation improvements at New Brunswick Station
2. Development of a station area design plan for further improvements at New Brunswick Station
3. Refining ridership estimates for the proposed start-up BRT alignments including surveys and focus groups about general transit needs
4. Preliminary design for bus priority improvements in the corridors and areas examined in this project.

In addition, NJ TRANSIT will continue to work closely with DEVCO, the City of New Brunswick, Middlesex County, and Rutgers University in the planning and implementation process.

