bus rapid transit a community plan

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This document seeks to support the City of Newark and NJ TRANSIT in their effort to deploy Bus Rapid Transit (BRT) throughout Newark and its neighboring municipalities. It was written by faculty, staff and graduate students at both the New Jersey Institute of Technology and Rutgers University, and coordinates two years of academic research that included extensive community outreach, site visits, focus groups, design studios and other substantial efforts. Its publication is being financially supported by members of the Newark Alliance with matching funds provided by the New Jersey Casino Reinvestment Development Authority. Its authors created it to communicate to all parties ranging from government officials to neighborhood residents. The report identifies the best components that a Newark BRT should feature, where it should travel, hurdles that must be overcome for it to succeed, and the types of residential and commercial development BRT might foster.

This effort continues the momentum generated by the launch of the Newark Vision Plan, organized by the Regional Plan Association and announced on the one hundredth day of Mayor Corey Booker's administration. The Vision Plan led directly to NJ TRANSIT'S launch in April 2008 of the Go Bus, an enhanced bus service with many BRT features. The Liberty Corridor Project, a fully developed BRT that will pass through downtown Newark and connect Bloomfield to Newark Airport, will begin service in late 2009. With the correct guidance and community endorsement, these strong first steps can ultimately lead to a fully developed BRT network throughout the City. A new transportation system in Newark can have a profound and positive impact and lay the foundation for the next generation of growth. With a new federal administration, these changes can begin sooner than expected.

Newark is ready for BRT. The City is a major transportation hub with an extensive transit system in place. Over 40 bus routes carry a remarkable 205,000 passengers each day, and connect to the over 540 trains stopping at Newark's Penn and Broad Street Stations. One of the primary advantages of deploying BRT in Newark today is the City's urban pattern of broad streets that evolved around the trolley network of the last century. BRT can be deployed on these streets and reach most of the City without costly infrastructure changes or undue traffic disruptions.

Starting with Australia's O-bahn Busway over 30 years ago, BRT has been implemented in many different countries and evolved into a system that offers a wide array of features. Transit providers today can select from these to create a unique system that suits local budgets, conditions and needs. Of the many systems studied, this report showcases Boston; Curitiba, Brazil; and Los Angeles because they offer important lessons for Newark.

This report proposes a comprehensive BRT network for Newark that better connects it with its surrounding communities and integrates seamlessly with existing rail service. All lines would pass through a downtown zone defined by major BRT stations that would support the central business district. Lines in the southern part of the City would terminate at a newly developed BRT node at the Airport Station.

BRT thrives when it is integrated with land use planning. To show how this might occur in Newark, this study showcases four sites and how they can develop around BRT. These sites are at Springfield Avenue and South 10th Street; the Orange Street Light Rail Station, the Bloomfield Avenue Light Rail Station, and the Train Station at Newark Airport. Each site proposes phased development and projects fiscal impacts.

A final section outlining implementation possibilities calls for leadership and coordination between three constituencies: communities, agencies and governments. A specific strategy for the deployment of BRT is described in this section.

The Transportation Research Board suggests that BRT have "a quality image and unique identity." In working with a host of different communities, from neighborhoods to business boardrooms downtown, we heard one voice: BRT should be the best it can be and something that all the city's residents can take pride in. These are the fundamental goals this report seeks to achieve.

WHAT IS BRT?

describe brt

There are many ways to describe BRT. Here are three definitions taken from leading research organizations:

The Federal Transit Administration

...defines BRT as an innovative transit system that "combines the quality of rail transit and the flexibility of buses. It can operate on bus lanes, HOV lanes, expressways, or ordinary streets. A BRT system combines a simple route layout, frequent service, limited stops, Intelligent Transportation Systems (ITS) technology, passenger information systems, traffic signal priority for transit, cleaner and quieter vehicles, rapid and convenient fare collection, high-quality passenger facilities, and integration with land use policy."

The National Bus Rapid Transit Institute

...defines BRT as "an innovative, high-capacity, lower-cost public transit solution that can achieve the performance and benefits of more expensive rail modes. This integrated system uses buses or specialized vehicles on roadways or dedicated lanes to quickly and efficiently transport passengers to their destinations, while offering the flexibility to meet a variety of local conditions. BRT system elements can easily be customized to community needs and incorporate state-of-the-art, low-cost technologies that attract more passengers and ultimately help reduce overall traffic congestion."

Report 90 of the Transit Cooperative Research Program

...describes BRT as "a flexible, rubber-tired rapid transit mode that combines stations, vehicles, services, running ways, and its elements into an integrated system with a strong positive identity that evokes a unique image. BRT applications are designed to be appropriate to the market they serve and their physical surroundings. BRT can be incrementally implemented in a variety of environments. In brief, BRT is an integrated system of facilities, services and amenities that collectively improves the speed, reliability, and identity of the bus transit."

brt's relation to bus and light rail

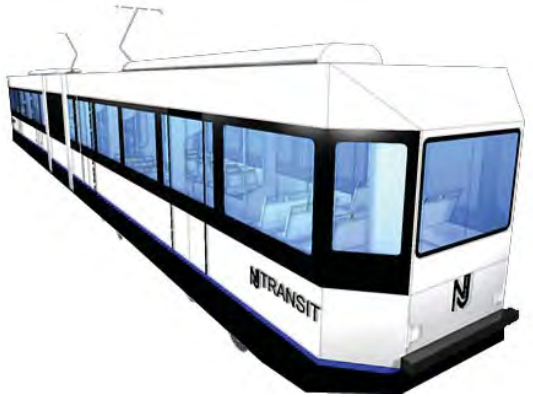
BRT combines the best features of the bus and light rail providing a reliable and efficient mode of transportation.

the best of buses.....

-Relatively lower deployment and operating costs
-Flexibility that allows for incremental deployment
-Ability to travel on any roadway unrestricted by rails

the best of light rail.....

-Low boarding floors and wider interiors
-Implementation on dedicated tracks
-Possible addition of multiple cars on one route
-Reduction of vehicle dwell time due to off- board payment systems



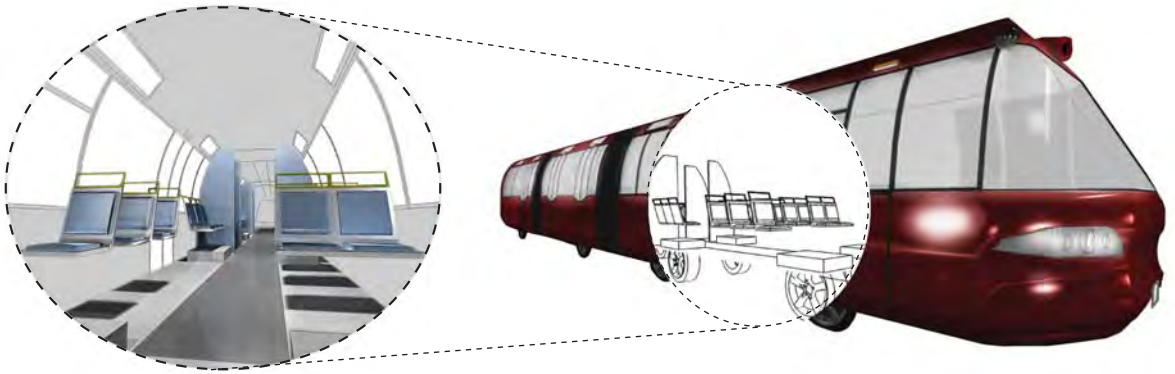
brt

-Flexibility and cost efficiency
-Low floor buses
-Innovative prototypes with dynamic exteriors
-Longer than typical buses
-Streamlined payment systems leading to faster running times
-Guidance systems
-Improved propulsion systems
-Station platform alignment
-Dedicated lanes
-Landscaped roadways

interior configuration options

BRT vehicles can have interiors similar to light rail with wider bodies and multi-directional seating. Seats can be arranged front, back, and towards the center of the vehicle. Vehicles can also include features like bike racks and storage systems for luggage.

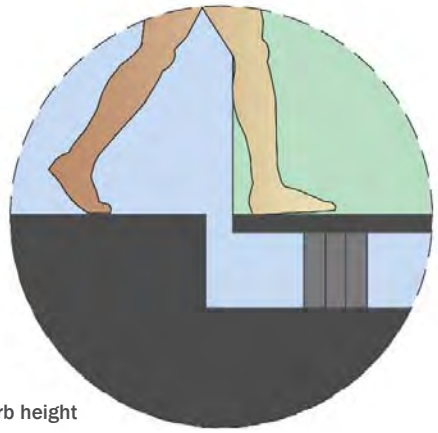
Low floors are essential as they provide for easier boarding which in turn leads to faster running times. Higher ceilings are an additional benefit. Although there currently are state legal hurdles regarding low-floor vehicle's weight, these are in the process of being revised.



brt interior view

raised station platforms

BRT station platforms can be made level to coordinate with low-floor vehicles. Platforms as low as 12 inches above the pavement can provide a seamless transition from the station to the vehicle. These heights are low enough in relation to typical Newark sidewalks to make for effective handicapped accessibility without complicated ramps or elevators.

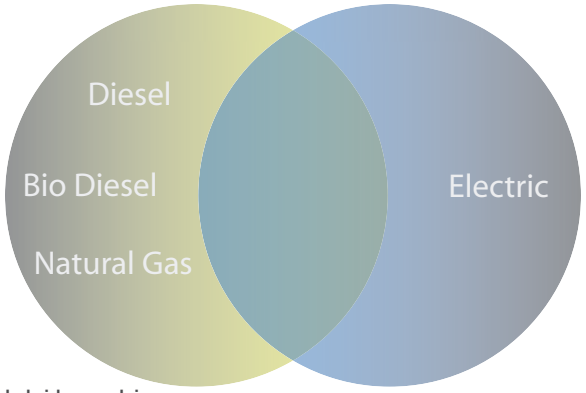


raised curb height

enhanced vehicle propulsion

The early 21st century has already witnessed market-tested developments in vehicle propulsion systems. BRT systems often use hybrid-electric propulsion vehicles (similar in principal to the Toyota Prius) that reduce fuel consumption by at least 20% in comparison with conventional buses. These vehicles are quieter, less polluting, smoother riding, and provide a greater low floor area due to axle reconfiguration. The BRT industry is likely to develop and produce a variety of alternative systems, including all electric, biofuel and hydrogen vehicles. These innovations should be closely monitored as BRT develops in Newark. A system using innovative new vehicles would mark a new beginning for the City and is likely to be well received.

hybrid drive train



hybrid propulsion

POSSIBLE BRT FEATURES FOR NEWARK

brt roadway options

Curbside stations are similar to what exists at most bus stops today. BRT stops are typically more developed structures that include lighting, advertisement, and real-time bus information systems.

Bump outs are sidewalk extensions, usually at corners, that allow passengers to load without the bus pulling out of traffic. Bump outs also tend to slow down traffic. Their use does tend to create congestion while a bus is loading at a station.

Queue jumpers are buses that receive a green signal at a traffic light that allow it to be first to move into traffic.

Curbside bus lanes are designated rights-of-way along a street's edge. To work effectively, these lanes must be strictly enforced against parked or idling vehicles. Vehicle speeds are also limited by proximity to pedestrians. Time-designated curbside lanes exist today on Broad Street.

Center single lanes are typically used to avoid congestion during the morning or afternoon rush hours. Well-coordinated, guided vehicles could use single lanes interchangeably throughout the day.

Center double lanes replicate how trolleys once traveled on wide streets such as Broad Street. This arrangement gives BRT the highest priority. It typically requires center median stations and vehicles with doors on both sides.

POSSIBLE BRT FEATURES FOR NEWARK

guidance systems

When added to a designated roadway, guidance systems can greatly enhance performance by limiting side-to-side movement. In effect, they allow BRT vehicles to operate like a train. These systems can be mechanical, optical or magnetic and can maintain different degrees of separation from normal traffic. Because of their precision, guidance systems allow for the width of a lane to be reduced by up to 25% and permit vehicles to pull within two inches of a platform at speeds up to 30 miles per hour.

Mechanical guidance systems, first used on the O-Bahn Busway in Adelaide, Australia 30 years ago have transitioned to far simpler and sophisticated systems such as the "Translohr" guideways currently used in Italy and France. The relatively new optical and magnetic systems have been tested in the United States and elsewhere and will likely become more mainstream. The deployment of guided BRT in Newark can speed buses through downtown. Which type is ultimately selected should be the result of careful study combined with local testing.

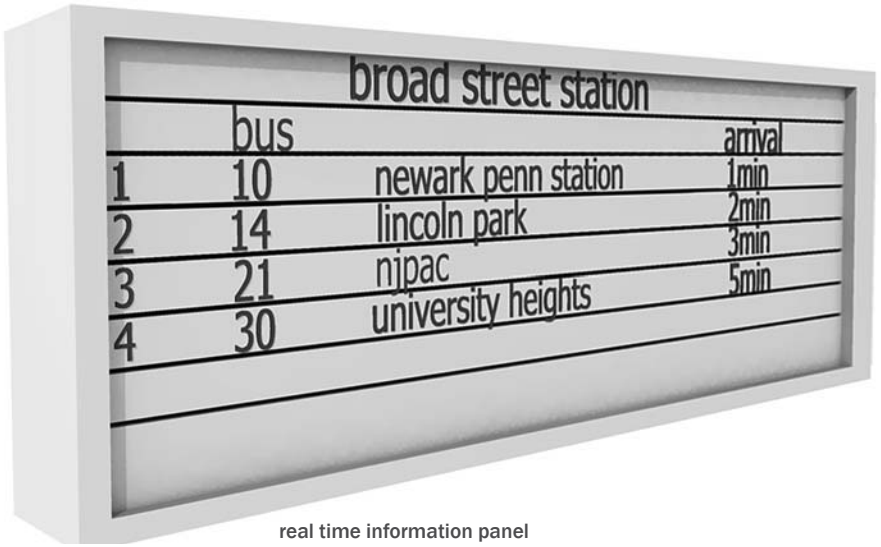
magnetic

optical

mechanical

real time information

Incorporating Real Time Information through GPS also improves reliability. Real Time Information can provide a sense of certainty by updating riders of the next bus' arrival.



real time information panel

POSSIBLE BRT FEATURES FOR NEWARK

streamlined payment methods

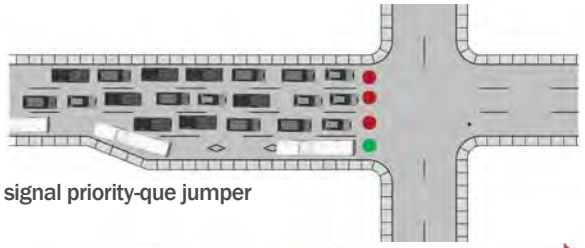
BRT system operators today can choose from several different types of payment methods that greatly improve upon the older practices of placing coins in a fare box or buying tickets prior to boarding. Many agencies today use Transit Cards with magnetic or radio frequency technology to read payment information.

Either of these methods makes the system easier to use by decreasing dwell time at a stop, among other things. Also, by knowing how many passengers will board a bus, the central controller can fine-tune signal priority.

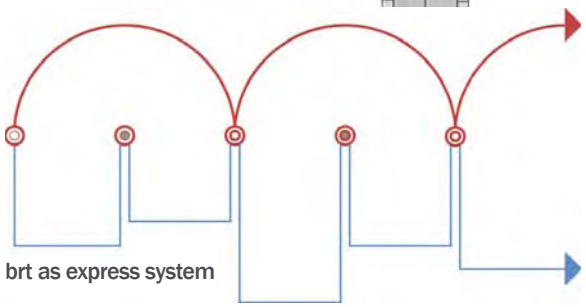
Transit Card usage can:
-combine trips
-allow for weekly or monthly passes
-allow for special uses, such as students who ride a specific trip to school

Smart cards, which are used in Washington, D.C., Bogota, Columbia, and are being tested in New York City, can be swiped prior to boarding a vehicle. Similar to the practice on Newark Light Rail today, a fare enforcement officer can periodically scan the card to check for payment. A more advanced method, a mobile ticketing system allowing cell phones to purchase an electronic ticket, is currently being tested in Bogota, Columbia.

mobile ticketing



signal priority-que jumper



brt as express system

signal priority

A BRT vehicle can outperform local buses through signal priority, which allows operation in an express mode. At a traffic signal, priority is granted to BRT vehicles. A central computer controller gracefully coordinates green signals for BRT vehicles with broader traffic flow. Results in Los Angeles show that this reduces travel time by as much as a 10%. When integrated with designated roadways, signal priority creates an express system that completely insulates a BRT vehicle from local traffic.

smart card ticketing

los angeles california

If some doubt that BRT can succeed in New Jersey's car culture, the system's successful deployment in Los Angeles has shown that it can work in even the most car oriented cities.

Starting with two demonstration lines on the Wilshire-Whittier and Ventura Boulevards routes, the Metro Rapid BRT was an instant success with a 20% ridership increase over the course of the first year. Within two years of its implementation, weekday ridership had increased by 40%. Metro Rapid features well-branded bright red compressed natural gas-fuel buses operating with prioritized traffic signals in mixed traffic, widened stop spacing and new, high-tech stations with passenger amenities. Because of its success, the Los Angeles MTA introduced the Orange Line with even more BRT features. It too opened to high ridership, and other lines are planned.

The history of BRT in Los Angeles is unique in how the community was involved. BRT came about because of a lawsuit filed by the Bus Riders Union and community organizations who sued the MTA for "operating separate and unequal bus and rail systems that discriminated against bus riders who were disproportionately poor and people of color." To avoid litigation, the MTA signed a consent agreement, which required it to reduce fares and improve and add new service, resulting in Metro Rapid. Community activism in Los Angeles left a distinct mark on BRT that ultimately led to success and high ridership. A vigorously active community in Newark, of course without litigation, is critical to making BRT succeed.

los angeles metro rapid

curitiba brazil

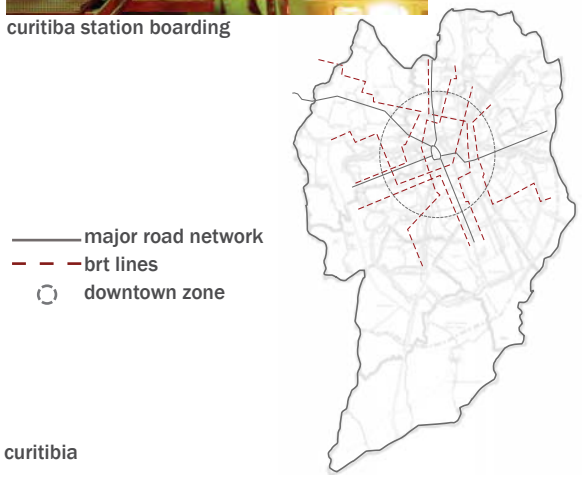
Curitiba's bus system has evolved into a model BRT system, one that is visited by many agency and municipal officials who are considering BRT. It is one of the most heavily used, yet low-cost, transit systems in the world. In the 1960's the population of Curitiba, Brazil was close to Newark's current size. A Master Plan was developed which focused on integrating affordable and implementable transportation in a comprehensive urban system. As a result of the Master Plan, Curitiba grew in a planned manner along designated corridors.

The system includes parallel express and local BRT lines that operate in a radial pattern from the center of the city along five main arteries that link to circumferential cross town connectors. This arrangement, along with zoning and land use policies, influenced high-density industrial and residential development throughout the city, thus diversifying the importance of downtown Curitiba as the primary destination of travel and spreading out congestion.

Curitiba's BRT includes the following characteristics: integrated planning, exclusive bus lanes, signal priority for buses, pre-boarding fare collection, level bus boarding from raised platforms in transparent tube stations, free transfers between lines, large capacity articulated and bi-articulated wide-door buses and an overlapping system. The bus system, which evolved over stages, is composed of a hierarchical system of services, with different routes for different purposes. At each stage of implementation, innovative low-cost options for new services were chosen over more costly alternatives.

Initially, Curitiba considered building a subway but chose BRT because it was faster, less disruptive, and cheaper—a fraction of the cost of a subway. Despite relative affluence and high rates of car ownership in Curitiba, the BRT system has attracted many 'choice' riders, those who could otherwise drive. Municipal incentives, such as employer transportation subsidies, make BRT even more attractive. Population along the arteries grew about fifty percent more than the overall growth rate of the population in the city. Could BRT bring growth along Newark's corridors at the same pace?

curitiba station boarding



curitibia

OTHER BRT SYSTEMS

boston massachusetts

In creating the Silver Line in Boston, the Massachusetts Bay Transportation Authority (MBTA) had goals that are remarkably relevant to Newark: they hope to stimulate economic development along certain corridors by linking those corridors to job centers, including an international airport. To do so, the MBTA has declared it a 'line' just like the Red or Green subway lines, underscoring the Silver Line's full integration with the other buses, subway, commuter rail, and ferry systems in the Greater Boston area that the MBTA operates.

The Silver Line is one of the Federal Transit Administration's showcase BRT projects. Phase I of the Silver Line runs 2.2 miles largely along Washington Street, extending to a terminal at Dudley Street in Roxbury. Since service began in July of 2002, the development adjacent to it has been significant, despite the fact that it has never been popular with the community. Phase I replaced rail service lost when the Orange Line elevated rail was removed in 1987, and its replacement with BRT has been seen by many to be discriminatory to the area's predominantly minority community. Whether this sentiment changes in the face of significant economic development can offer important lessons for Newark.

Phase II, which opened in December of 2004, is a disconnected 1.5 mile segment beneath the Fort Point Channel between South Station and Logan International Airport that runs hybrid dual-mode buses capable of using overhead wire. This segment includes three highly developed stations: South Station, Courthouse, and World Trade Center. In an area abandoned by industry, each has spurred development even greater than that around Dudley Square. This segment has also evolved into a popular mode of travel from the airport to downtown.

The planned Phase III of the Silver Line will connect Phases I and II via an additional mile-long tunnel section, perhaps as early as 2010. The routing will provide direct connections with both the Orange and Green Lines in the downtown area, thus fully integrating the Silver Line with the broader system. There are many aspects of the Silver Line that BRT developers in Newark can study closely.

silver line

existing transit connections

Newark is a major regional transportation hub. Each day, 70,000 people enter the city by car, train, or bus. Three existing transit hubs - Penn Station, Broad Street Station and Newark Liberty International Airport Station - offer various intermodal connections.

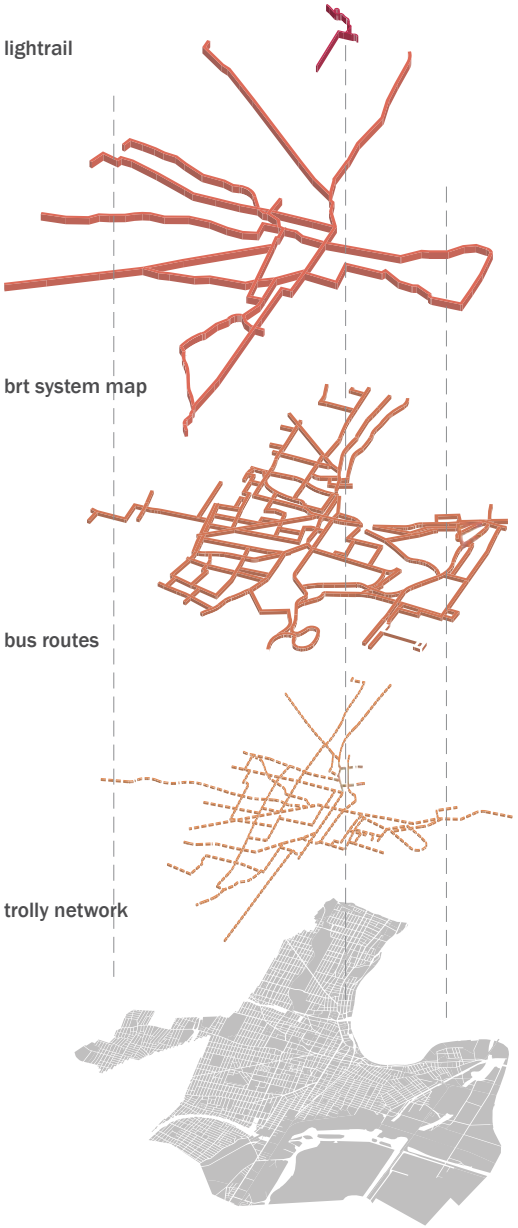
existing infrastructure

Newark's previous success with a rapid, above-ground transit system serves as a reference for its future transit growth. In 1889, Newark implemented a trolley system that reached all of its five wards. Eventually the trolley lines were converted to diesel buses. Beginning in 1850, Newark's population rose at a steady rate until its peak in the 1950s. It is no coincidence that its population decline began when the trolley system ceased. The proposed BRT routes follow the main arteries from the trolley system and interface with existing rail, light rail and bus lines in the City system.

cost

One of the greatest benefits in choosing BRT over Light Rail is cost. Using National Bus Rapid Transit Institute figures, on average, every mile of Light Rail is equivalent to 12 miles of BRT.

According to NJ TRANSIT, the next phase of the Newark-Elizabeth Light Rail, connecting Penn Station to Lincoln Park, would cost as much as $350 million bringing the total cost of the recent extensions to the system to $600 million. This total amount could develop the complete BRT network described later in this proposal.



high ridership

Almost half the daily commuters coming to Newark come by train alone (33,000) with 540 trains stoping at Newark's Penn and Broad Street Stations. These connect to the Newark Light Rail that carries 6,000 passengers daily. About 40 bus routes intersect with this service, carrying 205,000 people each day. This translates to 7 out of every 10 Newark residents using a bus daily. However, because buses only move as fast as the traffic they travel in, they are often delayed.

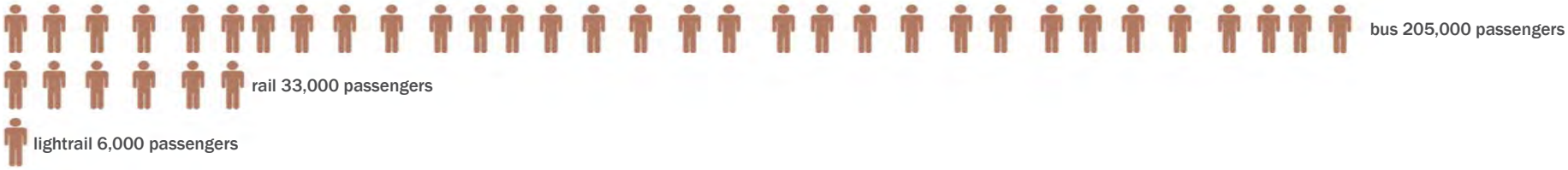
congestion

According to the New Jersey Department of Transportation, most roadways in the Newark area are at or approaching maximum capacity. According to its most recent tally of congestion costs (2007), the Texas Transportation Institute estimates vehicular congestion costing the New York metropolitan area at $4 billion, which adds, on average, 30% to the time of everyone's work trip. One can conclude that there is no room for automobile infrastructure growth in the Newark region. There is only room for transit growth.

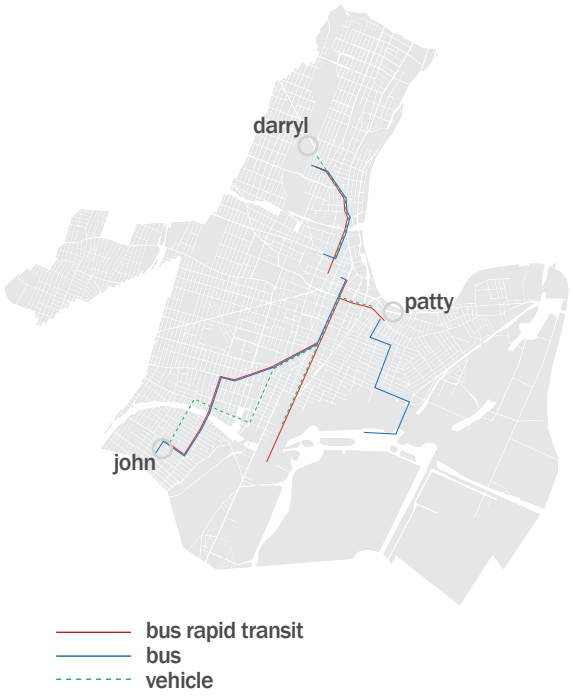
forty cars

one bus rapid transit

THE CASE FOR NEWARK typical riders



john, patty and darryl



The following examples illustrate how BRT will help citizens reach their destinations economically and more efficiently.

1. John lives in the South Ward, on Chancellor Avenue near Maple. Each day, John takes the bus to downtown Newark for work. Depending on traffic, he spends roughly 25 to 40 minutes on the bus and spends $1.35 each way. If he were to drive, he would spend anywhere between 20 to 30 minutes because of traffic and expect parking to cost $9. The AAA estimates that the total cost of driving today including fuel, insurance, etc . costs 52 cents per mile. At 3.8 miles his trip would cost him about $2. Adding parking would bring it to $11. Taking BRT would take 14 minutes and cost $1.65.

	bus	car	brt
john			
time	25-40min	20-30min	14min
cost	$1.35	$11.00	$1.65
patty			
time	25-35min	10-15min	12min
cost	$2.15	$15-$30	$1.65
darryl			
time	25-30min	20-25min	5min
cost	$1.35	$3.25	$1.65

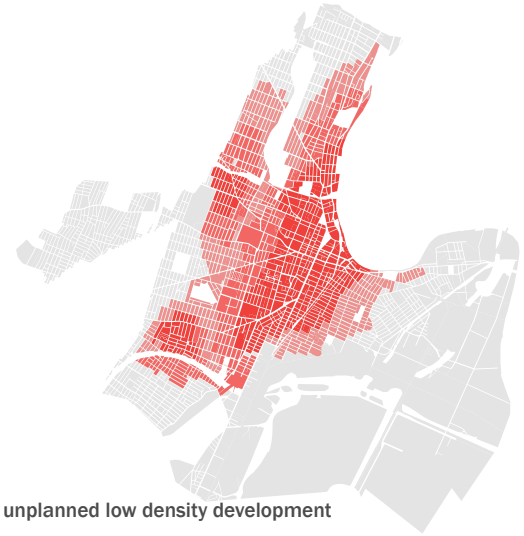
2. Patty lives in the East Ward near Ferry Street and works at the Airport. Taking the bus today costs her $2.15 each way and takes anywhere from 25 to 35 minutes to get there based on traffic. Because of a $15-$30 parking fee, driving is out of the question. The BRT system would allow her to get there at a guaranteed time for an affordable amount.

3. Darryl lives in the North Ward and attends Rutgers University. Taking the bus can vary greatly because of traffic. Driving would take about the same time with the same traffic, plus an additional amount of time to find parking. If the BRT system were possible to Darryl, he would get to school in 5 minutes and pay about the same as if he drove.

smart growth

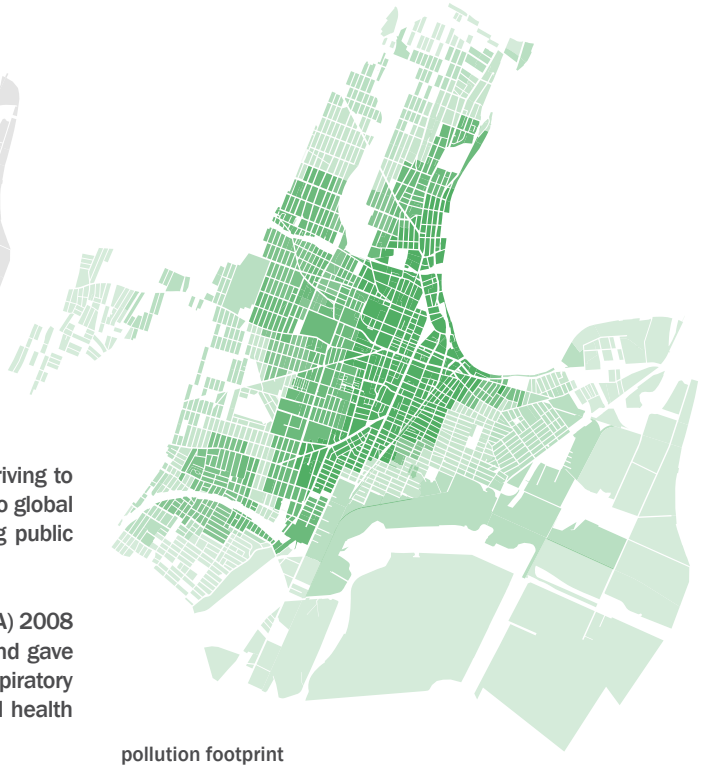
Many communities today are following Smart Growth planning strategies that recommend investing "time, attention, and resources in restoring the community and vitality to center cities and older suburbs." Smart Growth emphasizes the need to reduce congestion, improve communities, enhance mobility and accessibility, and preserve the environment.

Following smart growth principles, Newark could grow along the new transit corridors. Mixed-use dense development will enable optimum utilization of land. This in turn will enable growth in population that will sustain businesses and encourage further development along the corridors. Because most of the land in Newark already has the water and sewer infrastructure to support growth, the city will grow with a net increase to its ratable base.



unplanned low density development

high density corridor development



pollution footprint

environmental benefits

According to a 2007 study by American Public Transit Association (APTA), a household that switches from daily driving to public transportation can reduce their carbon footprint by 30%. Carbon is the primary greenhouse gas contributing to global warming. The study also states that when compared to other household actions that limit carbon dioxide, taking public transportation can be more than ten times greater in reducing ones carbon footprint.

Newark's air is full of other pollutants beside carbon that automobiles exhaust. The American Lung Association (ALA) 2008 annual report card on air pollution lists Newark/New York as eight in the top ten cities most polluted by ozone and gave Newark a grade F for 24 hour particle pollution. The ALA cites one in four of Newark children suffer asthma or other respiratory illnesses, a rate almost double the national average. Decreasing traffic in Newark can have immediate and local health impacts.

newark liberty airport station

A BRT line to the airport has many benefits. There are already more than 24,000 jobs at the Newark Liberty International Airport and considerable growth is predicted especially in its air freight sector. The BRT can efficiently carry passengers and airport employees to the Newark Airport station where commuters can transfer to the Air Train, which carried 100,000 passengers per day in 2008. BRT can attract potential economic developments along the line to the airport, thus creating jobs and increasing property values.

As part of the network proposed in this report, the Frelinghuysen, Crosstown and Bloomfield lines can easily stop at the Airport Train station along their routes, but this is currently prohibited due to restrictions related to how the station was funded. This will take time to sort out, but given the huge economic benefits that it can achieve, it ultimately can and should happen. In the meantime, the BRT can use the airport loop road to maintain access as the Liberty Corridor Line proposes.

newark airport

newark airport

minneapolis airport

Minneapolis offers an example of how an airport, mass transit and regional retail can be integrated. The Minneapolis-St. Paul International Airport accommodates the same amount of travelers as Newark per year. In 2004, Minneapolis Metro Transit completed the 12 mile Hiawatha Line light rail connecting downtown, the airport and the Mall of America. The $715 million project currently carries 28,000 passengers per day and helps the Mall of America earn more than 1.8 billion dollars annually.

Integrating the mall and airport with a Newark BRT network can have similar results at one third the cost. As an additional benefit, BRT can spur development in the many vacant parcels surrounding Newark Airport. A more thorough analysis of opportunities at both the airport and mall are included later in this report.

new jersey garden mall

The Jersey Gardens Mall, just across the New Jersey Turnpike from the airport, can be a powerful ridership attractor to a Newark BRT network. It can provide both jobs and shopping opportunities for Newark residents. Because of the recent relative strength of foreign currency, NJ TRANSIT has had to substantially add bus service to accommodate out-of-town visitors arriving for weekend shopping sprees.

downtown zone

dated: 1920's

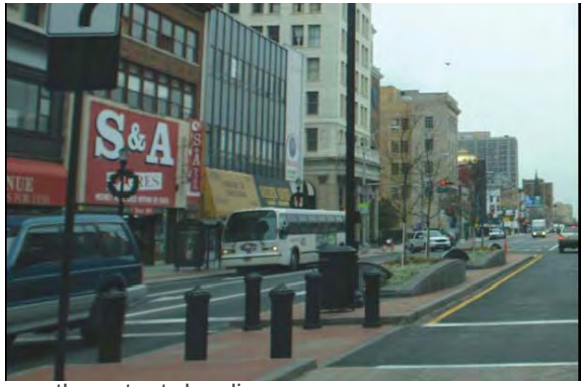
The heart of Newark lies where Broad and Market cross. Also known as 'the four corners,' this intersection carries many superlatives: According to the Newark-Elizabeth Comprehensive Bus Study (2009), it accounts for the greatest number of bus boarding by far in the region. It is also one of the most dangerous intersections for pedestrians. Most importantly, the memory of the intersection's glory days, when it was lined with large department stores, is etched in many Newarkers' minds. Establishing this intersection as a major BRT hub can help it sort out its circulation problems and fulfill its commercial potential.

dated: 2007

broad street rendering

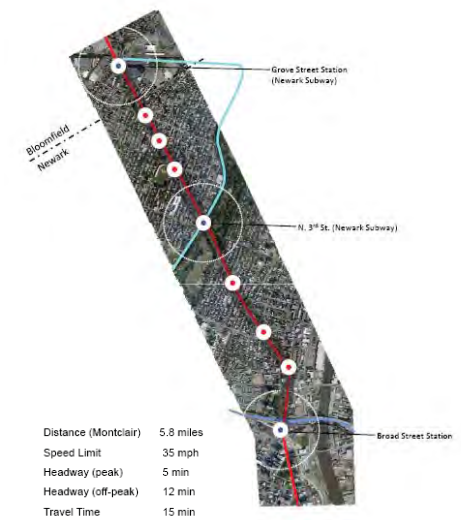
Historically, trolleys ran down the center of Broad Street with stations in the boulevard median. This study recommends that this arrangement be restored with BRT in a dedicated transit way in the center of the street. Currently, express buses travel curbside, which has several drawbacks: Both moving and double parked vehicles impede buses and fast moving buses threaten pedestrians, inches away on the sidewalk.

In addition to streamlining bus operations, placing a station in the middle of Broad Street will create a large area where riders can wait, thus reducing the significant congestion on the sidewalks. This plan is complicated by the recent median improvements that have been made at this location. It is always difficult to convince residents to undo a significant public investment, but the tremendous potential that BRT offers should more than offset it.

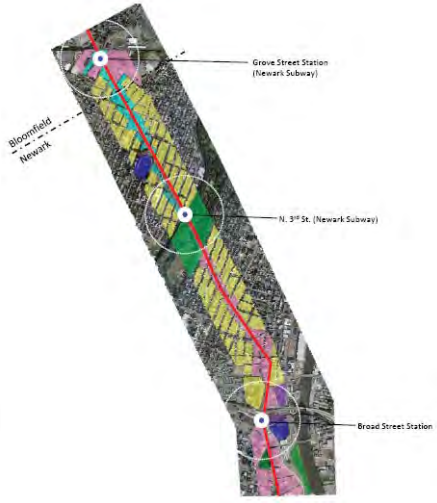


recently constructed medians

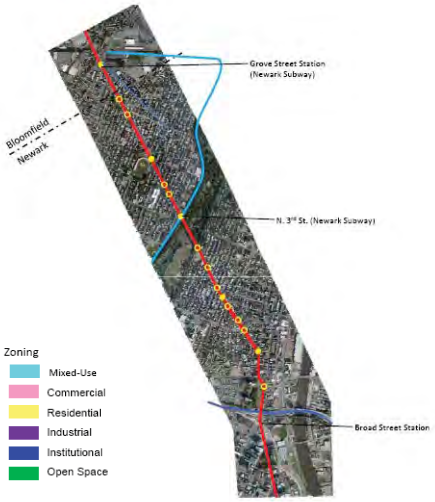
community focus group



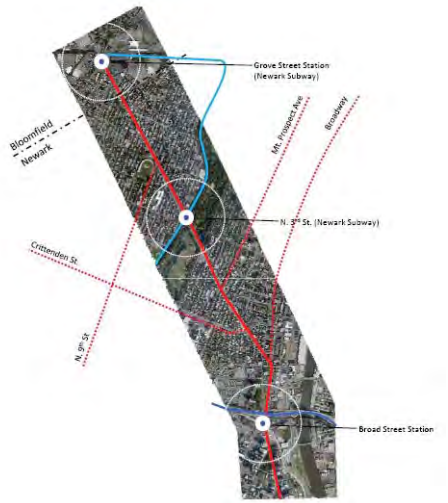
stop locations



zoning



signals



bus routes

Newark's most important asset is a strong sense of community. There are many Community Development Corporations (CDC) throughout the city that are coordinated through the Local Initiatives Support Corporation of Greater Newark & Jersey City LISC. Engaging these organizations will best assure that BRT will become unique to Newark and remain a lasting asset for the city.

As a pilot program for how this process might work, NJIT faculty and students conducted a focus group at La Casa de Don Pedro to examine a detailed area of Bloomfield Avenue that will be served by the Liberty Corridor BRT.

Community outreach resulted in the following important recommendations:

1. BRT stops should be placed at the most effective locations in a community. Locals are best aware of traffic problems that can hamper BRT.
2. The BRT will succeed if it travels to where residents want to go.
3. Community involvement will be critical to BRT's success.

la casa de don pedro presentation

4. Zoning and land use changes should coordinate with BRT development.
5. The BRT should be integrated with the larger transit system through a common fare method.
6. The BRT should accommodate passengers with disabilities.

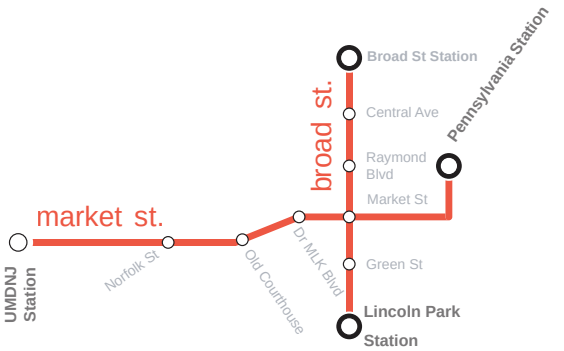
The adoption of these recommendations will not only greatly enhance the technical performance of BRT, the community outreach process itself can raise awareness of BRT and grow a community's pride, an important step in establishing a unique BRT brand for Newark.

brt system development

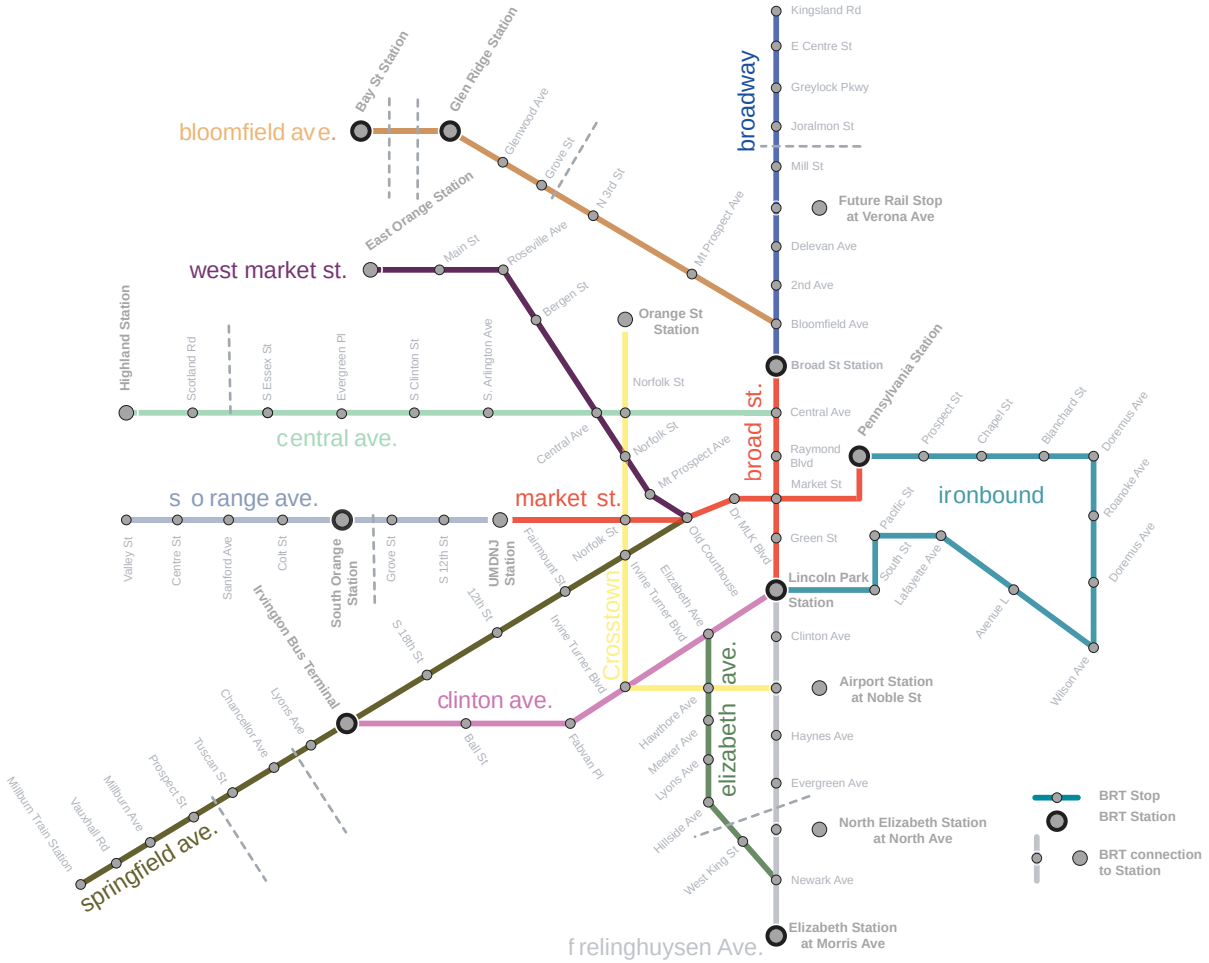
This report proposes a comprehensive BRT network serving the entire City and beyond. Once beyond City limits, lines terminate at bus or rail stations located in major retail locations. These proposed lines would serve Broadway, the Ironbound, Frelinghuysen Avenue, Elizabeth Avenue, Clinton Avenue, Springfield Avenue, South Orange Avenue, Central Avenue, West Market Street, Crosstown, and Bloomfield Avenue. The system is designed to integrate seamlessly with existing rail and light rail both in and outside Newark.

All lines pass through a downtown zone centered on Broad and Market and stop at the major hub located there. The downtown zone is defined by major BRT stations at the existing Newark Penn Station and Broad Street Station, and proposed stations at Lincoln Park, UMDNJ and Orange Street. Local buses terminate at these hubs with only BRT buses traveling into the zone at very frequent intervals using signal priority and designated bus lanes. BRT vehicles terminate at the station opposite the downtown from where they entered with some exceptions. For example, several lines, such as the Bloomfield Liberty Corridor Line, will proceed beyond the proposed Lincoln Park Station to the Airport.

downtown freefare zone



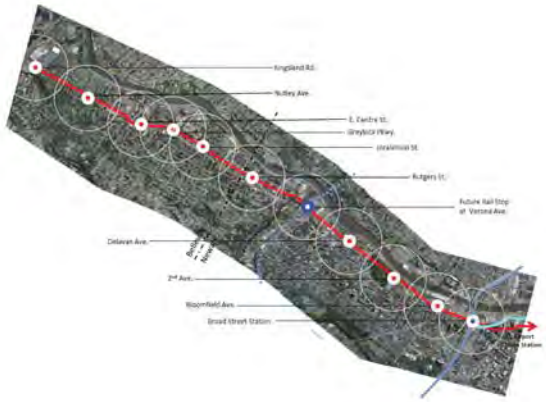
This report also recommends that riders travel free of charge in this zone. This practice is modeled on a highly successful system in Portland Oregon, where bus and light rail are free of charge in the entire downtown. A free downtown zone in Newark will speed boardings, promote the use of BRT, and ensure that it becomes well used. As in Portland, once riders leave the zone, they will be expected to purchase a fare.



system map

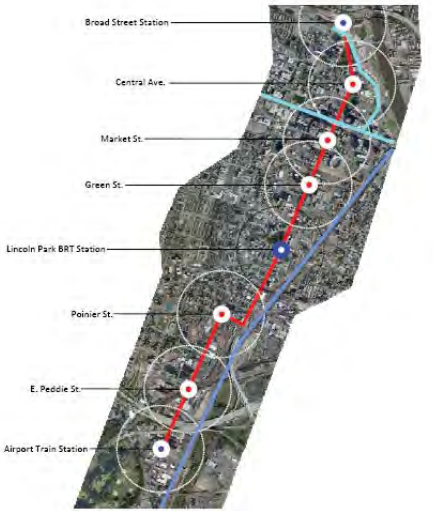
THE CASE FOR NEWARK comprehensive BRT network

broadway



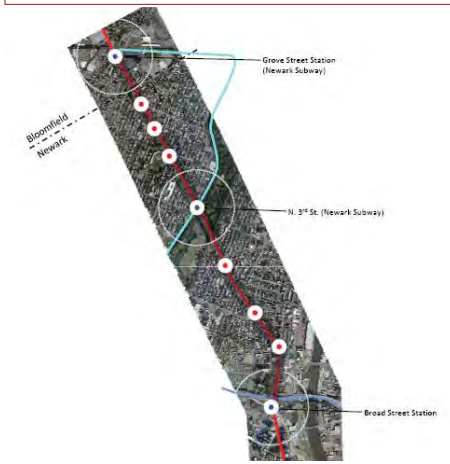
The BRT route for Broadway will begin at Kingsland Road in Clifton, pass Broad Street Station and continue to the proposed Lincoln Park Station or proceed to the Airport. The lane configurations on Broadway are 4-lanes and 2-lanes with curb parking on both sides. The zoning in the corridor is mixed use, residential and commercial.

broad street station



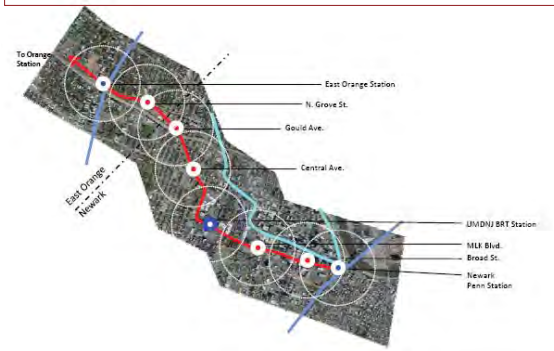
A Broad Street BRT will begin at Broad Street Station and continue further south; making stops at strategic locations like the proposed BRT stations at Lincoln Park, and the Airport Train Station.

bloomfield ave



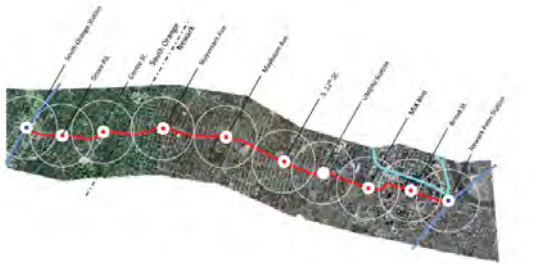
Bloomfield Avenue BRT will travel from the Bay Street Station in Montclair, stop at Broad Street Station and continue further south. Designated bus lanes will allow for faster service. The Liberty Corridor Line is scheduled to commence service on Bloomfield Avenue in late 2009. BRT vehicles will depart from the Bloomfield Train Station in Bloomfield Center and make several stops along the corridor.

west market st.



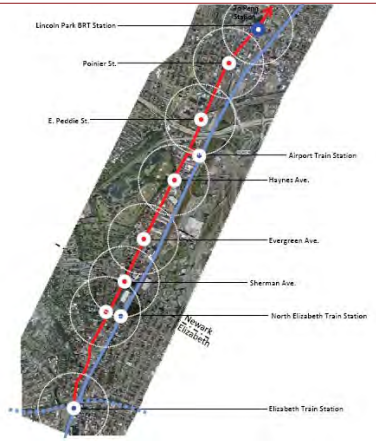
The route for West Market Street will begin at the Orange Rail Station and continue for about three miles until it reaches Penn Station. West Market features several institutions such as the Essex County Courthouse, Essex County College, UMDNJ and the now-closed United Hospital with some residential use mixed in. West Market is primarily 4-lanes. Between Penn Station and beyond Broad Street where it becomes Market, it hosts retail uses and is six lanes, including two for parking.

south orange ave



The BRT route for South Orange Avenue will begin at the South Orange Rail Station and terminate at Penn Station after traveling about 4 miles. The South Orange corridor features mostly a mixture of residential use and light retail. There are also several large cemeteries, parks, apartment buildings, and Seton Hall University along the route.

felinghuysen ave

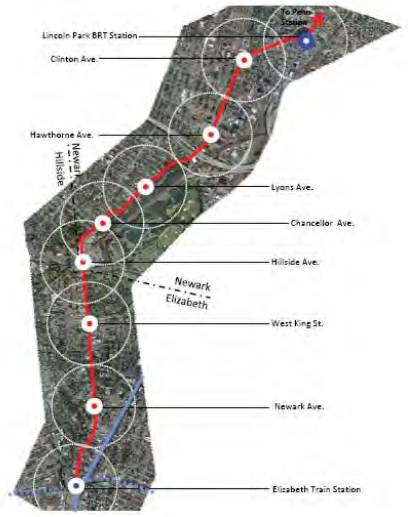


The Frelinghuysen Avenue line runs from the Elizabeth Train Station to Broad Street Station. This corridor consists of primarily industrial warehouses and abandoned factories. The lane width is approximately 70 to 80 feet wide. The roadway along Frelinghuysen Avenue has two extra wide one-way lanes traveling in each direction with parking on each side. The area near the park has dense residential housing on the east and industrial buildings on the west side. The BRT will stop at the large inter modal hub proposed at the Newark Airport Train Station.

ironbound

The Ironbound circuit travels from Penn Station, loops through the Ironbound neighborhood and terminates at the proposed BRT station at Lincoln Park.

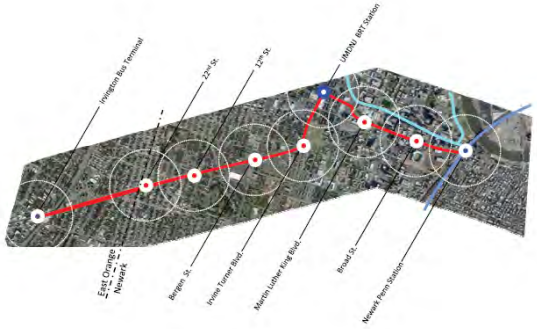
elizabeth



The BRT route for Elizabeth Avenue will travel from the Elizabeth Rail Station and terminate at the Broad Street Station. The roadway width along Elizabeth Avenue ranges between 50 and 60 feet. Uses along Elizabeth Ave are primarily residential and parkland with both high density housing, single family housing, and a hospital located there. Elizabeth Avenue may benefit from a single center lane.

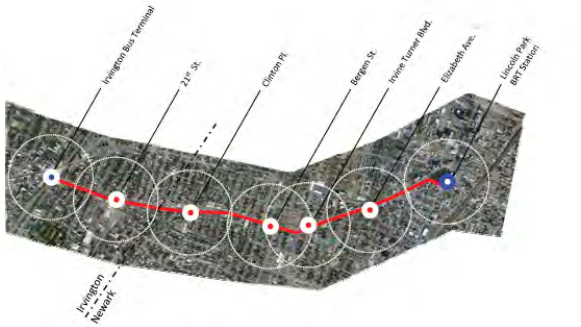
THE CASE FOR NEWARK comprehensive BRT network

springfield ave



The Springfield Avenue BRT begins at the Irvington Bus Terminal and continues east for about six miles until reaching Penn Station. This corridor currently features the GoBus that began service in 2007 and is scheduled to be upgraded once the Liberty Corridor is complete. Springfield Avenue could benefit from a queue jumper arrangement to better integrate with traffic when this upgrade occurs.

clinton ave



The Clinton Avenue BRT will begin its route at the Irvington Bus Terminal and continue east for about three miles until reaching Broad Street Station. A bumpout strategy would allow riders' access to BRT more efficiently.

crosstown

The Crosstown BRT route will connect the proposed BRT/Light Rail Station at Orange Street with the proposed BRT hub at the Newark Liberty Airport Train Station. This important line will stop at the proposed BRT station at UMDNJ and intersect with almost all other BRT lines in the City, including those serving Frelinghuysen Avenue, Elizabeth Avenue, Clinton Avenue, Springfield Avenue, South Orange Avenue, Central Avenue, and West Market Street. Service will travel along First Street and Irvine Turner Boulevard. The corridor includes hospital, commercial and residential uses. Because of its importance, this report highly recommends that it be given priority over others.

central ave

BRT traveling along Central Avenue begins at the Highland Rail Station on Scotland Road in Orange and terminates at Penn Station The corridor features several different types of land uses, primarily light commercial and residential. Central Avenue is primarily four lanes, including two for parking.