Go BRT!

High Quality Rapid Transit For the 21st Century --

A Policy Primer on Bus Rapid Transit (BRT)

Breakthrough Technologies Institute – Washington, DC

------ Introduction -----

Communities need rapid transit to reduce congestion, improve air quality, and provide mobility options, particularly for underserved populations. But deciding what type of service to provide can be difficult.

Heavy and light rail are popular options, but they are expensive. Traditional bus service is flexible and inexpensive, but often has a negative public image.

Fortunately, there is a third option. New technology combines the most popular features of rail with the flexibility and cost advantages of roadway transit. This technology, known as BRT, has been successfully implemented in South America and Europe and is now gaining popularity in North America.

BRT Vehicle Taking on Passengers

This paper explains how BRT works and why BRT is becoming increasingly popular among passengers and communities. BRT -- the transit system of the 21st century!

----- What is BRT? -----

BRT is a roadway-based rapid transit system that looks and feels much like a subway. It offers high capacity rapid transit service on dedicated lanes or city streets. By using roads, BRT does not require expensive tracks and other support infrastructure, thus saving millions of dollars in capital investment costs.

Proposed BRT Concept in Oregon

At the same time, BRT offers passengers a high quality rapid transit experience. Passengers walk to comfortable stations, enter with a pre-paid fare, walk to the platform, board through multiple doors, and quickly move to their destination. Service is so frequent that schedules are not necessary. Vehicles are low emission hybrid electric or CNG and in the future may be powered by zero-emission fuel cells.

There are seven major components to a BRT system. Communities can choose from a variety of options to custom build a rapid transit system that meets their needs and fits within their budget. The seven components are:

(1) Dedicated Right of Way. BRT vehicles can operate in their own right-of-way (ROW), thus greatly increasing speed and reducing travel time. Unlike rail, this ROW can be shared with emergency vehicles, providing congestion-free travel for public safety, or with high occupancy vehicles (HOV's)..

Dedicated ROW in Charlotte, NC

Where appropriate, BRT vehicles can leave the dedicated ROW to take passengers directly to their destination. This avoids the need for feeder bus systems, driving, or other options to reach the final destination. While off of dedicated ROW, BRT vehicles can use special technologies to keep traffic lights green as the vehicle approaches, thus minimizing red light delays.

Dedicated Shoulder ROW Provides Clearly Marked BRT Lane

(2) Stations: BRT stations are convenient and easily accessible. They can range from enhanced bus shelters to complete subway-like facilities. Because BRT is high capacity, it can support transit-oriented development around stations, thus adding value to the system and to the community. Like rail, stations and ROW can offer a sense of permanence that attracts economic activity.

Attractive stations are functional and enhance customer experience

This flexibility in station design enables communities to invest in the stations that are right for them. Stations may include parking, shops, and bicycle and pedestrian access. Stations also may include amenities that provide customers with a better transit experience, such as passenger information signs and "next vehicle" displays and announcements.

Good station design should include "passing lanes" that enable BRT vehicles to get around docked vehicles. This enables express service and increases travel speeds. Many rail systems, particularly "double-track" designs like Washington's Metro, force vehicles to wait for trains to clear stations, thus causing delays.

Good station design also should include a passenger platform that is level with the door of the BRT vehicle. This enables passengers to directly board the vehicle without steps or other obstacles, and thus reduces the time the vehicle must be in the station.

Simple design provides shelter and a raised platform on a limited budget -- Curitiba

Of course, none of this needs to be expensive. Communities can invest initially in simple shelters that provide protection from the elements and a raised platform. Over time, more elaborate stations can be built as circumstances merit.

(3) Vehicles: There are many vehicles available for BRT service. Generally, these vehicles are easy to

board, comfortable to ride, and quiet. They also use clean fuel technologies, protecting the local environment.

"Flex-trolleys" are flexible BRT vehicles

Some vehicles look and feel like light rail and have the option of using overhead power, but they are not limited to that power or to tracks. Other vehicles look more like traditional buses, but are easier to board and have no diesel exhaust.

The most advanced vehicles offer optical or magnetic guidance, enhancing safety and allowing the vehicle to pull within inches of the platform, just like a subway.

BRT vehicles also include low floors and multiple, double-wide doors. This makes boarding easy and convenient, even for disabled persons. Some vehicles include on-board information systems, telling passengers where they are and when they can expect to reach their destination.

Vehicle infomation system.

Vehicle capacities vary greatly depending on the size and design of the vehicle. Double and triple-section "articulated" vehicles can carry 150 or more passengers, providing ample capacity for peak rush hour demand.

(4) Fare Collection: Like rail systems, BRT fares can be collected before entering the platform. This is important, because the longer the vehicle spends in the station, the longer the total trip time. Where a city also has a rail system, the same fare collection technology can be used, enabling passengers to use a single fare card or token system.

Advance Fare Collection in Bogota

(5) Service: BRT provides high frequency service throughout the day, eliminating the need to consult a trip schedule. Just arrive at the station, and the next vehicle appears within minutes!

BRT also provides the unique ability to offer a combination of express and local service. Depending upon demand, vehicles can stop at all stations, some stations, or no stations between their origin and destination. Unlike many rail systems, passengers are not forced to sit through multiple stops before reaching their destination.

(6) Route Structure: BRT's flexibility makes it possible to design systems that offer more passengers the option of a no-transfer, one-seat ride to their destination. For the price of a single rail line, multiple BRT routes can be implemented, offering the community a thicker network of rapid transit routes.

Moreover, these routes can go into neighborhoods and office parks, thus bringing transit to the people, rather than forcing people to get to a rail station by driving or via feeder bus systems. Once passengers are delivered to these "off-line" stations, the BRT vehicle can return to its dedicated ROW. This is not possible with rail.

The route structure can be presented in easy to read format, eliminating the need to follow complicated bus maps. This makes the system more attractive to a greater number of customers, thus enhancing ridership.

Sample BRT route map – Cleveland, Ohio

(7) Intelligent Transportation Systems(ITS): BRT uses ITS systems to track vehicle locations, control traffic signals, update passengers on travel times, and perform other important functions. These technologies can provide "next vehicle" displays, announce arrivals and departures, ensure better traffic flow, and enhance safety and security on the vehicle and in the station.

BRT Passenger Information System

Some ITS technologies are in fixed locations, such as at the station or on board the vehicle. Through digital wireless, however, next bus and other information can be transmitted to a customer's cell phone. Thus, customers can better time their departure for the station and spend more time with family or at the office.

Next bus telephone display in Seattle integrates transportation and digital communications technologies.

----- Why BRT? -----

Transit funding is extremely limited. According to the American Public Transportation Association, the demand for transit construction is over $42 billion per year. Yet, the federal government's main source for this funding, the "New Starts" program, has only $1.2 billion to spend annually – that's just 3 percent of the demand.

To solve congestion, air quality, and mobility problems, communities need to innovate. They need to think differently about how they provide mobility options, and they need to find cost-effective options.

Communities also need to think differently about how they use their transportation infrastructure. According to the Surface Transportation Policy Project, the vast majority of federal transportation dollars went to roads between 1992 and 2001 -- just 5 percent went to transit. Although this is discouraging, all signs indicate that this trend is going to continue, if not accelerate, for the foreseeable future.

To make significant advances in public transportation, we need strategies that leverage the massive investment in roads and highways. We need to make road and highway investment work *for* public transportation, not against it.

BRT offers the ability to leverage road spending to provide transit service. This reduces the cost of providing transit and increases the value of road investments, because those investments are being used to carry more than single occupant vehicles. Best of all, BRT offers this opportunity without sacrificing capacity or quality.

The Federal Transit Administration (FTA) recognizes that BRT provides the best hope for adding significant transit capacity. In its 2004 budget, FTA is seeking a change in the "New Starts" requirements to encourage communities to invest New Starts funds in BRT.

This is significant, because traditionally New Starts funds have been reserved principally for rail investments. Because of this policy shift, communities may have a better chance of federal funding if they pursue BRT over other options. Currently, the federal government can provide up to 80 percent of capital costs for infrastructure and vehicles, so federal funding is extremely important.

In addition to policy changes at the federal level, there is real world experience to show how BRT can work by leveraging existing road investments. Los Angeles is in the midst of building a massive BRT system known as Metro Rapid. Phase I was

recently completed on two corridors – the Wilshire-Whittier line and Ventura Boulevard.

In just two years, these routes have attracted over 55,000 new passengers per day. At least one third of these passengers had never taken public transportation before. Capital costs were $195 thousand per mile, because the city was able to use existing streets.

LA's Metro Rapid is popular and cost effective

By contrast, a proposed heavy rail extension in Northern Virginia is projected to cost roughly $167 million per mile. That's 856 times as much as Metro Rapid! Yet, it is only projected to attract 71,900 new passengers per day.

The price tag for many rail projects is simply too high, even if they are viewed as an "investment" in the region's future. BRT can provide the same benefits, plus offer significant advantages such as flexibility and express service. That is why the FTA is encouraging communities to consider BRT.

Metro Rapid demonstrates how innovative use of resources can provide economical BRT service, Other systems demonstrate that additional investments, particularly in dedicated right of way, can yield further benefits.

Curitiba

According to a recent study by the Federal Transit Administration, Bogota's Transmilenio, New York's Lincoln Tunnel XBL, and the Sao Paolo BRT system each have peak capacities of at least 25,000 passengers per hour. Systems in Curitiba, Brazil and Ottawa, Canada carry up to 15,000 passengers per hour.

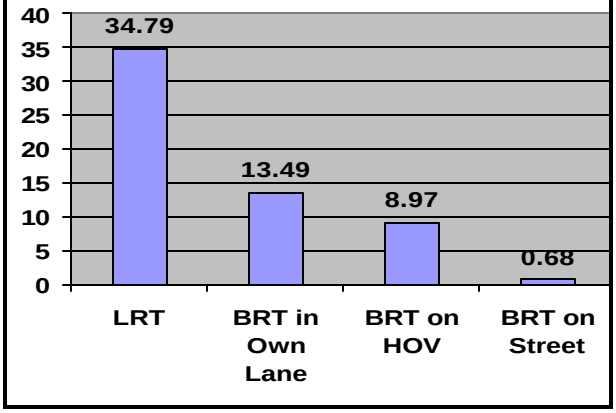
Bogota's Transmilenio carries more passengers than the best US rail systems and does not require operating subsidies

By contrast, the Washington and San Francisco, subways, two of the busiest and best heavy rail systems in the United States, have peak capacities around 15,000 per hour, according to a report by the Transportation Research Board, an arm of the National Academies of Science. The proposed Virginia heavy rail extension would have a peak capacity of only 9,600 passengers.

Fortunately, high capacity BRT does not necessarily mean relatively higher cost. In a recent study, the United States General Accounting Office (GAO) compared BRT with light rail in six US cities (Washington and San Francisco are heavy rail, which is even more expensive).

As shown in Figure 1, the GAO found that capital costs per mile were significantly lower for BRT than for light rail. In fact, they found that the capital costs for BRT on arterial streets (the Los Angeles model) was just 2 percent of the average capital cost for light rail.

Figure 1: LRT/BRT Capital Costs Per Mile (Millions of Dollars)



The GAO study found similar results with operating costs. In five of the six cities studied, the GAO found that BRT had lower operating costs per vehicle hour. In all six of the studied cities, the GAO found that BRT had a lower operating cost per vehicle revenue mile.

The GAO and other studies confirm the real-world experience of BRT, particularly in South America. In both Bogota, Columbia and Curitiba, Brazil, BRT systems are operating without subsidies, achieving 100% or more cost recovery from fares. Even the best rail systems receive substantial operating subsidies and will never recover their costs.

In addition to cost savings, BRT offers substantial opportunities for economic development around stations. According to a recent study by the FTA, BRT attracts substantial transit-oriented development and has a positive affect on land values.

BRT adds value and character to a community

In Ottawa, BRT has attracted over $1 billion (CDN) in development, and Pittsburgh's busway attracted over $375 million in development in the 1990's. In Brisbane, Australia residential property values increased 20 percent in the first year of BRT operation.

BRT also offers opportunities to address equity issues associated with transit investment. In some cities, transit investment has focused upon building capacity to high income neighborhoods seeking commuting options. Billions have been spent on rail systems for commuters, but relatively little has been spent to provide transit to low income neighborhoods.

BRT's flexibility makes it easier to serve low income neighborhoods with high quality transit. As in Los Angeles, BRT can be added quickly to existing streets. Over time, the system can be enhanced with dedicated ROW and other amenities.

----- *Conclusion* -----

BRT is Better Rapid Transit! It is an innovative marriage of transit and roadway technologies that provides high quality transit at a fraction of the cost of rail. It can provide 21st century mobility at a reasonable price. And it can provide this mobility to all neighborhoods.

BRT can be built in phases, providing almost immediate relief and offering cost-effective future expansion options. As in LA, existing roads can provide initial ROW. Dedicated ROW can be added as demand builds.

Unlike rail, dedicated ROW offers the potential for multiple use, including HOV lanes, as well as congestion free corridors for emergency vehicles.

Perhaps most important, BRT can get people where they want to go, when they want to get there. BRT – tomorrow's mobility, today!

Curitiba

----- *What is BTI?* -----

This paper was prepared by the Breakthrough Technologies Institute (BTI), a DC-based non-profit that promotes environmentally sound energy and transportation technologies. Our BRT program is funded by the W. Alton Jones Foundation.

Contact: Bill Vincent, (202) 785-4222 Extension 30, vincent@fuelcells.org. Or visit www.gobrt.org. BTI, 1625 K Street, NW, Suite 725, Washington, DC 20006.