

# Memorandum

**Date:** July 21, 2003

**Re:** Bus Rapid Transit: Defining What is Good for Transit Investment

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## **What is a good bus rapid transit system?**

Bus Rapid Transit (BRT) systems can take several forms or gradations in which they improve bus efficiency over traditional bus service. The definition of a good bus rapid transit system/model should be based on improvements in conventional bus service and include some general characteristics:

1. Provide more efficient transit service, including higher peak-capacity, faster travel times and fewer emissions per passenger mile traveled than conventional bus service.
2. Produce long-term benefits for land use that will decrease sprawl and protect open space.
3. Produce a net increase in transit ridership by allowing local transportation planners to invest in a cost-effective alternative to other transit modes (i.e. light and heavy-duty rail) they would otherwise be unable to consider.

### **1. Provide Efficient Service**

Bus Rapid Transit systems redesign conventional bus service by combining the traditional bus model with road design and technology improvements to increase travel efficiency, thereby increasing its attractiveness to transit riders.

Vehicles being designed specifically for BRT service have larger passenger capacity, low-floor design for easier boarding, advanced ticketing to decrease boarding times and wider doorways. These combine to improve the flow and efficiency of passenger boarding.

Technologies integrated in combination with efficient vehicle design include signal prioritization that keeps lights green to reduce stops at intersections and on-board global positioning systems to monitor vehicle timing and inform awaiting passengers of station arrival times. Other design improvements include modernized pick-up areas over longer distances, thereby reducing the number of stops and providing passengers with a more comfortable "bus stop" environment.

These modifications can be combined with street design improvements to further increase vehicle flow. Dedicated lanes on arterial streets are a low-grade, cheap method of improving vehicle flow. More expensive upgrades create street barriers to restrict single-occupancy vehicle sharing of dedicated lanes. HOV lanes are another option, since these dedicated lanes already exist for the benefit of high-occupancy vehicles. Since HOV lanes tend to be located at the median of highways and other high-speed arteries rather than streets, it is possible that their use will have a less significant effect on land use patterns and economic development. HOV lanes are likely to provide less direct street access for passengers, which may discourage high-density construction along the transit corridor.

Critical to the efficiency characteristics of BRT systems is to ensure their use of cleaner vehicle technologies, including cleaner-burning fuels and engine efficiency technologies.

Conventional bus service in the United States relies significantly on traditional diesel engine technology and diesel fuel, producing harmful emissions that can contribute to the development of pulmonary diseases including asthma (especially in children and the elderly) and lung cancer. Additionally, diesel fuel combustion produces carbon dioxide, one of the primary contributors to global warming, and compromises national energy security by continuing our growing reliance on imports of petroleum.

BRT can play a key role in reducing the negative effects of diesel fuel emissions produced by traditional bus service.

- A. Its higher capacity and efficiency reduces the emissions per passenger mile traveled (over conventional buses).
- B. It can contribute to changes in land use patterns that over the longer term play a critical role in increasing transit ridership (which is inherently less-polluting per passenger mile than single-occupancy vehicles).
- C. Investment in fuel efficiency technologies and clean fuel refueling infrastructure will reduce or eliminate harmful diesel emissions and can have trickle-down effects throughout a region's transportation system.
  - a. Investments in BRT systems should cover infrastructure for the fueling, maintenance and operation of advanced vehicle technologies and cleaner-burning fuels. If BRT is to be categorized as a New Start choice, it should provide the environmental health benefits already inherent in other New Starts modes like light and heavy-rail transit systems.
  - b. Buses are an ideal starting point for investment in the use of cleaner-burning fuels and supporting infrastructure. Bus fleets are centrally maintained and professionally operated, requiring less investment to support wide-scale clean fuel deployment. Supported with government funds, these investments often have effects on other private and public fleets which not only witness the benefits of using cleaner fuels and engine efficiency technologies, but also are in the position to use this infrastructure.
  - c. BRT systems establish the infrastructure needed to support the operation of clean buses in the rest of the conventional fleet. Fleet managers operating BRT are in a better position to choose to invest in cleaner fuels and engine efficiency technologies.

## **2. Affect Land Use Decisions to Reduce Sprawl and Increase Open Space**

Bus Rapid Transit does not inherently affect land use, but its establishment of high-volume transit corridors sets the stage for broader decisions to influence land use policy.

Due to BRT's flexibility, its effect on land use policy is less certain. Unlike light- and heavy-rail systems, city planners have the freedom to build a BRT system without integrating it into a long-term transit growth and development plan. But, importantly, BRT systems create corridors of high-volume passenger movement, similar to light- and heavy-rail transit systems. Long-term investment in a transit corridor is essential to encourage land-use policy changes, and developers must be convinced of a region's investment in these corridors to move forward and help make these changes. Conversations between city planners and land developers are critical to land use changes, in addition to commitments on both ends to support long-term investments to make the corridor a structural focus of future investment and growth. Case studies for Curitiba, Brazil and Ottawa, Canada demonstrate that city planners are critical to making commitments to the corridors established by the BRT

systems they put in place. Planners acknowledged the effect that high-volume; efficient transit has on the local economy and land development. While it may be easier to use BRT as a way to simply improve transit service, decision makers in these regions worked to integrate BRT into a larger transit and long-term development plan.

### **3. Produce a Net Increase in Transit Ridership**

- A. BRT is a low-cost option for transit investment. Investing in a BRT system can help cities and regions achieve goals of improving air quality, decreasing congestion and increasing economic investment. It is a cost-effective, quick investment, providing important benefits like establishing high-volume corridors and generating interest in high-density land development around transit hubs.
- B. The important establishment of transit corridors can encourage land developers to support further investment in more efficient and long-lived transit service (like light and heavy rail)
- C. BRT can move transit forward. It requires less commitment in the long-term, but can start regional transportation planning moving forward on a future transit growth pattern. By starting regions off sooner (rather than waiting for the additional resources and time required for installation of a rail system), net increases in transit ridership also can be achieved sooner. City planners would be smart to take advantage of BRT's benefits (high-volume transit corridors) to integrate this with a long-term growth and development plan for the region's transportation system and land-use policy. Driving these decisions should be the desire to energize economic growth, improve public health and protect the environment.

BRT experts have acknowledged that this new, more efficient model of bus service can threaten investment in light rail systems, but this need not be the case. A successful BRT system could encourage the more permanent transportation investment provided by a rail system if localities saw the benefits provided by stable, high-volume transit corridors and high density development around them.