



Center for the
American Dream
of mobility and home ownership

Independence Institute • 14142 Denver West Parkway, Suite 185 • Golden, Colorado 80401 • 303-279-6536 • i2i.org/cad.aspx

BRT = BTR



Bus-Rapid Transit Is Better Than Rail: *The Smart Alternative to Light Rail*

Joseph P. Kubala, P.E. and Scott Barton

Issue Paper #10-2003

December 16, 2003

Bus-Rapid Transit Is Better Than Rail:
The Smart Alternative to Light Rail
Joseph P. Kubala, P.E. and Scott Barton
Center for the American Dream
Independence Institute
Issue Paper #10-2003
December 16, 2003

Abstract

Bus-rapid transit is a new type of mass transit that relies on buses that operate on schedules similar to rail transit lines, with greater frequencies and fewer stops (and therefore faster service) than conventional bus transit. A recent report from the General Accounting Office (GAO) compared bus-rapid transit with light rail and found that bus-rapid transit capital costs are as little as 2 percent of those of light rail. Further, bus-rapid transit costs less to operate and goes significantly faster than light-rail service.

Bus-rapid transit is also far more flexible than rail transit. It can be installed quickly, not requiring years of construction, and various aspects of it can be phased in over several years. It can allow more transit riders to go long distances without making inconvenient transfers.

In the long run, bus-rapid transit can operate on high-occupancy vehicle or high-occupancy/toll lanes, allowing even higher average speeds. The toll lanes would also provide a source of funds for congestion-free high-occupancy lanes.

The GAO specifically looked at Denver bus lines that resemble bus-rapid transit and found that they cost 80 percent less to operate than Denver's light rail and traveled at speeds 69 percent faster than light rail. Given bus-rapid transit's significant advantages over light rail, Denver's Regional Transit District should consider bus-rapid transit as a cheaper, faster, and more beneficial alternative to rail transit in all of its corridors. As the Federal Transit Administration recommends, transit agencies should "think rail, use buses."

Introduction

In recent years, a new type of mass transit called bus-rapid transit has emerged as a means of providing better transportation at lower costs. Bus-rapid transit, or BRT, is not simply bus service; instead, it incorporates a variety of new methods and technologies to improve performance. A BRT system may use bus-only highways, high-occupancy vehicle (HOV) lanes, high-occupancy/toll (HOT) lanes, improved service on city streets, or a combination. In addition, BRT can include new technologies and design improvements to enhance service, such as traffic-signal prioritization, better sta-

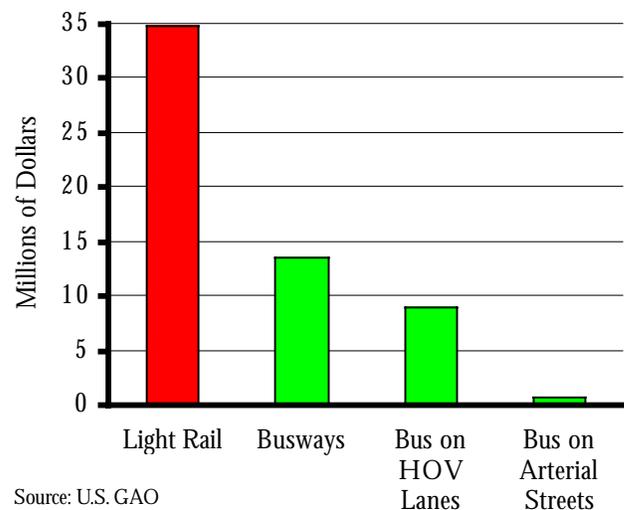
tions, fewer stops, and cleaner, quieter buses.¹

In a study published in September of 2001, the U.S. General Accounting Office (GAO) concludes that BRT presents an attractive option for mass transit and has several advantages over light rail systems. Since Denver uses elements of both systems, the GAO included Denver specifically in its comparisons.² Serious analysts should consider BRT in every corridor where light-rail transit is proposed, since it likely provides a very cost-effective transit alternative to light rail.

Capital Costs of Bus-Rapid Transit vs. Light-Rail Transit

According to the GAO, Bus Rapid Transit has a clear capital cost advantage over light-rail systems. The GAO identified three main locations of BRT implementation: Busways, HOV lanes, and arterial streets. While the fixed costs of building these three options varied, with busways being the most expensive, each option was less expensive per mile than light rail. As shown in figure one, light rail costs an average of \$34.8 million per mile to build, whereas busways cost \$13.5 million per mile, or 60.2 percent less than light rail. HOV lanes and arterial streets built for BRT use cost even less, at \$9.0 million per mile and \$680,000 per mile, respectively. These systems cost 61 percent, 74 percent and 98 percent less than light-rail systems.³

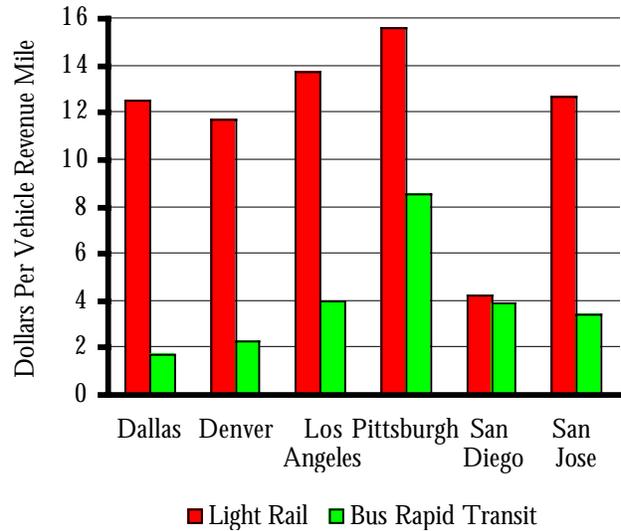
Figure One: Capital Cost Per Mile



Operating Costs of Bus-Rapid Transit vs. Light-Rail Transit

Proper consideration of the cost of one system compared to another must include not only the burden of initial construction, but the ongoing costs of operation, as well. The operating costs of these two systems clearly demonstrate a vast difference. The GAO used three measures to evaluate operating cost, and in every case the majority of cities have lower operating costs for their BRT systems than for their light rail systems. Figure two shows that the operating costs per vehicle mile are lower for BRT systems than for light rail. The GAO's estimate for Denver's BRT system is that BRT costs 80.8 percent less per mile to operate than light rail.⁴

Figure Two: 1999 Operating Cost



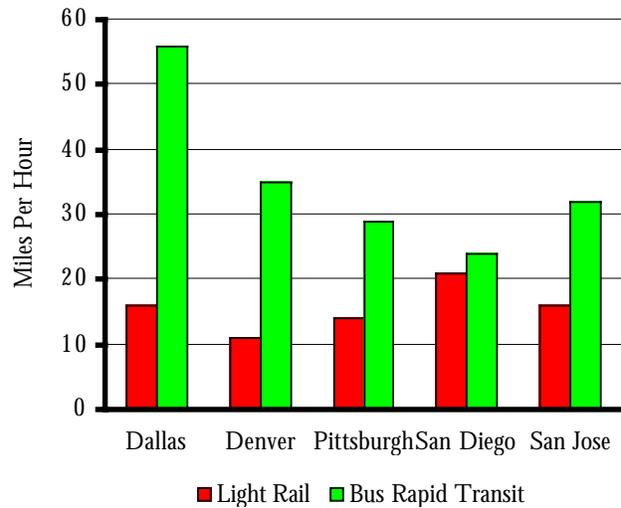
Source: U.S. GAO

Speed

The GAO report also indicates a marked difference in speed between Bus Rapid Transit and light rail systems. As figure three shows, the GAO found that in five cities that use both systems, the average speed of BRT service is faster than light rail, sometimes much faster. On average, the speed of BRT systems in these cities is 47 percent faster than light rail.⁵ In Denver, the GAO found that bus-rapid transit runs about 69 percent faster than light rail. The speed advantages of BRT are largely the result of running buses on highway HOV lanes, less loading times, and technological improvements to bus service, the GAO concludes.⁶

BRT is not only faster, it is more convenient due to fewer transfers and closer delivery to the consumers' destinations.

Figure Three: Average Speed in 1999



Source: U.S. GAO

More BRT Benefits

In addition to the speed and cost considerations already mentioned, the GAO report cites several other major advantages of Bus Rapid Transit.

- BRT is much more flexible than light rail. Since rail lines are fixed, they cannot respond to changes in employment and land use, whereas BRT service can be rerouted and shifted over time to correspond with the changing transportation needs of a city. The GAO report especially notes that BRT's flexibility is useful for growing cities like Denver, where many business areas must be considered in planning transit.⁷
- BRT systems can provide long-distance service without requiring transfers. This advantage allows BRT to overcome a serious disincentive to transit systems like light rail that usually require transfers between buses or automobiles.⁸
- BRT systems can be phased in step by step. Improvements can be made gradually and operations can begin before every element is in place, unlike light rail, which must be fully completed before service can begin.
- BRT systems that use HOV lanes can be easily converted to high-occupancy/toll (HOT) lanes to decrease congestion in regular lanes and to generate capital. The shared use of facilities between BRT, HOV, and HOT lanes yields more utility at no or minimal expense, less conflict between technologies, and the opportunity to generate revenue. According to the Colorado Value Express Lanes Study, converting HOV lanes to HOT lanes would permit single users to use the excess capacity of HOV lanes, without reducing the benefits of HOV lanes.⁹ Additionally, the tolls charged to single users would allow HOT lanes to pay for their operating costs and generate \$22.95 million in cash flow over fifteen years with minimum modifications made to HOV facilities.¹⁰ This extra capital could be used to finance system extensions or other transportation improvements.

Modernizing Perceptions

According to the GAO, one reason BRT systems are not more popular than light rail is that buses have a negative public image. As a result, some communities prefer light rail to buses, despite the advantages already noted, because light rail is perceived to be "faster, quieter, and less polluting" than buses.¹¹ However, the sophistication and enhancements that morph old bus systems into modern, high-quality BRT change the playing field. BRT is at least as aesthetically pleasing as light rail. Now all of the benefits of light rail are more widely available with lower cost and better performance. BRT outperforms light rail for speed, and the Federal Transportation Administration (FTA) and GAO have reported that buses have become substantially cleaner and less polluting. Finally, some of the factors that have contributed to the slow service of traditional buses can be eliminated by the new designs employed by BRT systems. BRT vehicles do not compete for space in stan-

dard lanes and instead travel at higher speeds in dedicated or shared lanes that are managed to eliminate congestion delays, reducing travel times compared to conventional buses and light rail.

Given the advantages of bus-rapid transit, both the General Accounting Office and the Federal Transit Administration believe that bus-rapid transit should be used more extensively as a transportation option. According to the GAO report, BRT "should be given serious consideration as options are explored and evaluated."¹² In the words of former FTA Administrator Gordon Linton, BRT systems show "how planning and technological devices will allow buses to operate with the speed, reliability and efficiency of light rail vehicles at a fraction of the cost."¹³ As a result of the cost, speed, and flexibility advantages, the FTA urges transit agencies to "think rail, use buses."¹⁴

Recommendations

In Denver, Bus Rapid Transit has not been used enough as a transit option. According to a recent Colorado Department of Transportation report on value-express lanes, Denver has only four facilities available for BRT. At the suggestion of local officials, the GAO study examined the 120X Express Bus Route on I-25 north of downtown, but HOV lanes are also available on US-36, Santa Fe Boulevard, and Broadway/Lincoln. Unfortunately, Denver's Regional Transportation District has been more concerned with implementing light rail corridors in different areas of the city.

RTD originally proposed adding a third light rail line called the Central Corridor from the I-25/Broadway light rail station through downtown to Union Station. However, neighborhood opposition has forced

RTD to abandon its light rail plans for the West Washington Park, Lincoln Park-La Alma, and Capitol Hill neighborhoods. Instead of running the light rail line along Broadway and Lincoln, RTD is considering a bus-rapid transit system using exclusive bus lanes where rush-hour-only lanes currently exist.¹⁵ The proposed costs of this system are consistent with the national trends: RTD estimates the BRT system will cost \$40 million to construct, versus \$300 million for light rail.¹⁶ Given the advantages already seen in Denver's current BRT system, the proposed Central Corridor route, and the national trends observed by the GAO, RTD should consider expanding the use of bus-rapid transit as a cheaper, faster, and more beneficial alternative to light rail in all its corridors.

References

1. United States General Accounting Office, *Bus Rapid Transit Shows Promise* (Washington, DC: GAO-01-984, 2001), p. 1.
2. The GAO studied Denver's Central Corridor and Southwest Extension light rail systems, and the 120X Express Bus Route, which runs all day, mostly on an HOV lane, Id., pp. 37, 50.
3. GAO, p. 17.
4. GAO, p. 23.
5. From GAO-01-984. Average BRT speed is 32.17 mph and the average light rail speed is 16.83 mph
6. GAO, pp. 26–27.
7. GAO, p. 33.
8. GAO, pp. 28–29.
9. High-occupancy vehicle and bus-rapid transit lanes have most of the expensive infrastructure improvements needed to convert to high-occupancy/toll lanes. New capital costs are limited to installation of toll readers, variable message signs to vary the toll pricing, and additional monitoring equipment for traffic flows. The marginal costs can quickly be repaid from tolls, providing surplus revenue for improvements to the corridors.
10. David H. Ungemah, *Colorado Value Express Lanes Feasibility Study: Final Report* (Denver, CO: Colorado Department of Transportation, April 2001), p. 81.
11. GAO, p. 30.
12. GAO, p. 33.
13. US Department of Transportation, "FTA Announces Projects Selected For Bus Rapid Transit Demonstration Program," June 8, 1999, <http://www.dot.gov/affairs/1999/fta0699.htm>.
14. GAO, p. 12.
15. Kevin Flynn, "Buses Replace Rail Tracks Once Again," *Rocky Mountain News*, June 3, 2002.
16. Jeffrey Leib, "RTD Weighs Options for Key Corridor," *Denver Post*, May 31, 2002.