REASON FOUNDATION'S SURFACE TRANSPORTATION INNOVATIONS
ISSUE NO. 45 - JULY 2007

Bus vs. Rail: Some Interesting New Data

The idea that bus rapid transit (BRT) is more cost-effective than light rail transit (LRT) has been in circulation for some time, but has been much-disputed. One big problem is that so many types of bus service are included under the heading of BRT that "average" figures on cost and ridership blur many real differences. What's been needed is an apples vs. apples comparison of high-end, exclusive-busway BRT with LRT.

Just about the perfect example of such a comparison was presented to a standing-room-only audience at the Transportation Research Board annual meeting in Washington, DC last January. It compares two recent projects in Los Angeles: the BRT Orange Line and the LRT Gold Line. "A Preliminary Evaluation of the Metro Orange Line Bus Rapid Transit Project," by William Vincent and Lisa Callaghan of the Breakthrough Technologies Institute, can be found at: www.gobrt.org.

The Gold Line opened in 2003, the Orange Line in 2005. Each is about 14 miles long, and each has 13 stations, about a mile apart. The Gold Line is a pretty typical LRT, while the Orange Line is an exclusive busway, with one lane in each direction. Both are built at-grade, and both have signal priority to give them green lights at intersections. Both serve primarily suburban, middle-class areas. So how do they compare?

First of all, while the BRT line was expected to start out at 5,000 to 7,500 average weekday boardings, growing to 22,000 by 2020, it actually achieved the 2020 goal by its seventh month. The LRT, by contrast, was supposed to start off with 30,000 weekday boardings and double that by 2023. But its actual ridership has been lower than that of the BRT line—and hence far below projections.

Next, take a look at costs. The capital cost of the BRT line was $349 million, while the LRT cost $859 million. Hence, the capital costs per weekday boarding are $16.8K for BRT versus $45.8K for LRT. The operating costs also favor BRT, with the Orange Line costing $0.54 per passenger mile compared with $1.08 for the Gold Line. On a cost per boarding basis, it's $3.79 for BRT versus $7.54 for LRT.

Interestingly, the report also compares the Orange Line BRT with a more prosaic version of BRT: the Metro Rapid express bus service on parallel Ventura Blvd. It turns out that travel times average about the same for both bus services. The express bus service (with no guideway cost) has a much lower capital cost, estimated at $11.7 million. That makes its capital cost per boarding a low $1.3K, compared with the Orange Line's $16.8K. Operating cost per boarding is $2.17, compared with $3.79 for the Orange Line. On the other hand, the exclusive busway Orange Line has the potential for faster trip times (if it didn't have to slow to 10 mph at intersections); it has attracted more than twice the ridership of the Metro Rapid bus, and it holds the potential for stimulating transit-oriented development near some of its stations. (I'm skeptical, but we'll see.)

The lesson here seems to be that a high-end BRT is far more cost-effective (bang for the buck) than a typical LRT, meaning you get a lot more transit per dollar spent. And if you are really short on transit dollars, a simple express bus service on a major arterial can give you tremendous value per dollar spent.

Now here are a few more tidbits on unanticipated consequences of implementing light rail. This is never done in a vacuum. Almost universally, the new LRT replaces a line-haul or express bus service, and the remaining bus service in the area is reconfigured to feed transfer trips to the LRT.

Sounds innocuous, but two recent experiences suggest there are negative consequences to doing this.

In Denver, the *Rocky Mountain News* reported (Dec. 6, 2006) that commuters are complaining bitterly about the impact of the new T-REX light rail line on bus service. The RTD eliminated nonstop express bus service from suburban park & ride lots to downtown and the Tech Center, so as not to compete with T-REX. But "many commuters have complained that the need to transfer from buses to trains to buses again has added from 20 minutes to an hour—or more on bad weather days—to their one-way travel times. Some are going back to driving or forming car pools."

The same kind of side effect is reported in Salt Lake City. Its mayor has been toasting the new light rail system's success in reducing mass transit's CO2 emissions. And on first glance, that appears to be the case. The electric-powered LRT system uses 2,676 BTUs per passenger mile, while its diesel-powered buses use 8,527 BTUs per passenger mile. Combined, the transit system now averages 5,574 BTUs/pass.-mi. But analyst Randal O'Toole asks the embarrassing question of what the situation was before the light rail system was implemented—and the bus system reconfigured as a feeder service. The answer is 4,700 BTU/pass.-mi. Thus, the net impact of adding LRT and reconfiguring the bus service was to increase energy use by nearly 19%. But it gets worse. Most electricity in Utah comes from burning coal, the most CO2-intensive way of generating electricity. When you crunch all the numbers, O'Toole concludes that Salt Lake's transit system today emits 0.9 pounds of CO2 per passenger-mile. The previous all-diesel-bus system emitted less than 0.7 pounds per pass.-mi. Those results would be different in a metro area where electricity came primarily from nuclear or natural-gas. But that's not Salt Lake. (Details at http://ti.org/antiplanner/?p=111)