

## Surface Transportation Innovations

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By Robert Poole

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### Can Freight Rail Reduce Urban Congestion?

During the past month, similar op-eds have appeared in many newspapers around the country. Their theme is summed up in this caption from the version in the *Orlando Sentinel*: "Freight Rail: A Decongestant for Orlando's Highways." Like the others, this one recited well-known projections of future urban congestion, a potential doubling of freight traffic by 2020, and the fuel-saving benefits of hauling a ton by rail rather than by truck. Then it suggested that if 25% of Orlando-area freight were shifted from truck to rail by 2025, there would be less congestion and air pollution, etc.

What's wrong with this picture? As author Wendell Cox noted in the article itself, "one of the fastest-growing segments of freight transport is intermodal shipping. Trucking companies place trailers and containers on trains for longer distances." Precisely. For long-haul goods movement, intermodal is often a viable competitor to trucking, despite some continuing reliability problems. But for the kinds of short-haul trips that make up much or most of the truck traffic on urban freeways, intermodal is a non-starter. So it's misleading to hold out the prospect of a significant shift from truck to rail as an urban congestion-buster.

But what about port cities like Los Angeles, Seattle, Miami, and New York/Newark? In those urban areas, large numbers of short-haul trucks clog the freeways in drayage operations, taking containers from the port to huge inland distribution centers, where in many cases the standard 40' containers are trans-loaded into 53' truck trailers to ship the goods to other distribution centers, warehouses, or large retailers. Couldn't those drayage trips be replaced by shuttle trains? Perhaps in some cases, but thus far the railroads themselves don't seem to be interested. A recent report in *Traffic World* (June 25, 2007) quoted rail consultant H. Declan Brown as concluding that "Most rail shuttle services do not make sense based purely on economics." Since railroads generally can't make money on trips less than 500 miles, "a shuttle service would require at least some government backing to make up the gap between length of haul and profits." So far, the two main railroads serving the ports of Los Angeles and Long Beach (BNSF and UP) have shown little interest in a shuttle service to Victorville, where developers are promoting the concept of an "inland port."

A more detailed look at where and how freight rail might be used to reduce truck traffic is a recent report produced for the Transportation Research Board's National Cooperative Highway Research Program's Project 8-42, Rail Freight Solutions to Roadway Congestion. *Guidebook for*

*Assessing Rail Freight Solutions to Roadway Congestion* is a detailed (142-page) introduction to the complexities of goods movement for transportation planners. It was produced by a team of researchers from Global Insight, Economic Development Research Group, MIT, and Wilbur Smith Associates. It is realistic about the scope for truck-to-rail shifts, and notes repeatedly that public-private partnerships involving tax money may be the only way to bring about many such projects. Reading this guidebook will quickly disabuse you of the idea that freight rail is going to provide a quick or large-scale fix for urban traffic congestion.

Specifically for urban congestion, especially in drayage situations (ports, border crossings, major cargo airport hubs), a more promising approach may well be toll truckways. While it is also looking into the shuttle train/inland port idea, the Southern California Association of Governments has invested considerable research into a toll truckway system to link the Ports of Long Beach and Los Angeles with the distribution centers of the Inland Empire. At \$10-15 billion (depending on configuration), the project would not be cheap—but preliminary estimates are that it could be financed largely or entirely via tolls. That may sound surprising, but drayage operators are paid by the trip, and an uncongested toll truckway offers the potential of up to twice as many trips per shift. And it could permit a single driver to haul not one but two 40' containers safely, on barrier separated truck lanes.

From where I sit, urban toll truckways look a lot more promising than rail shuttles.

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### **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](http://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>)

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## **Traffic Congestion and Urban Productivity**

For many, the link between congestion and economic productivity is a "no brainer". It follows simply intuition—if it takes longer to get to work, an appointment, or a client, productivity goes down and the economy suffers. The costs of transporting goods from factory to market are a big factor in where firms decide to locate their plants and their distribution centers. Congestion

reduces travel speeds and slows the pace of the economy. Just ask Wal-Mart. Indeed, the academic discipline of urban economics is founded on these ideas of transportation costs.

Nevertheless, remarkably little academic research has been conducted to empirically "prove" that lower travel speeds and traffic congestion reduce urban productivity. In a [previous issue](#), we reported on important work on this issue conducted by French economist Remy Prud'homme and his colleague Chang-Woon Lee. They showed that increasing travel speeds increased regional urban productivity. Now, an even more rigorous study of congestion's impacts on urban productivity by U.K. transport economist [Daniel J. Graham](#) is about to be published in the *Journal of Urban Economics*.

Cities have long been recognized for their productive benefits—they bring people, services, and goods together in synergistic ways that increase productivity in what economists call "agglomeration economies". But the productivity improvements aren't infinite; they are limited by "negative" externalities such as noise, pollution, and congestion that can put the brakes on urban growth. Graham wanted to see how traffic congestion influenced urban productivity through its influence as a negative externality.

So, Graham gathered data on employment, assets, location, payroll and other information from almost 50,000 firms in Britain's 10,780 wards. These firms were grouped into nine industries: manufacturing, construction, hotels & catering, transportation & storage & communications, real estate, information technology, banking & finance & insurance, business services, and public services. He then developed a measure of how congestion and its urban location influenced each firm's productivity.

Graham thought that previous measures of access, which relied primarily on straight-line distance, might not capture the full costs of congestion. His measure of congestion breaks from traditional research by adding the time and the speed of travel to a distance-based measure of congestion.

Graham's results comport with economic theory and intuition, supporting the proposition "that urban road traffic congestion plays a significant role in 'constraining' the benefits of agglomeration, and consequently, that it may serve to reduce achievable levels of urban productivity." Moreover, his estimates that include the effects of travel time and travel speed tend to find congestion impacts about 30% higher than traditional measures that rely primarily on more narrow distance-based measures.

In short, falling travel speeds and lengthening travel times means that businesses experience faster "diminishing returns", reaching a point of zero (or negative) productivity growth faster than those with higher travel speeds and lower travel times. The most pronounced effects were on productivity in the manufacturing, construction, hotels & catering, and IT sectors. Banking, finance & insurance, business services, and public services, traditional "CBD businesses", did not appear to be impacted as negatively.

Notably, Graham observes in his conclusion that the constraining impacts of traffic congestion on urban productivity tend to reduce densities in the most urbanized locations, promoting decentralization or, in more colloquial terms, sprawl.

--Samuel R. Staley, Ph.D., Director of Urban Growth & Land Use, Reason Foundation

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**Two New Reason Studies**

Summer may be a slow time for some organizations, but not for Reason Foundation. Our transportation program continues to turn out new policy papers, two of them in recent days.

You may already have seen one or more articles on David Hartgen's "16th Annual Report on the Performance of State Highway Systems (1984-2005)." Its release on June 28th triggered an AP article that was picked up in several hundred newspapers, and we've been inundated with interview requests by print and broadcast media since then. The study, like previous annual editions, reports on 12 key parameters of state highway performance, such as fatality rates, percent of deficient bridges, pavement conditions, and extent of urban congestion, all based on data reported by state DOTs to the Federal Highway Administration. It includes an overall measure of cost-effectiveness, that seeks to assess how much bang for the buck each state highway system delivers. On that measure, South Carolina and North Dakota scored best (low cost, high performance), with New Jersey bringing up the rear (very high cost, low performance). The study makes no policy recommendations, but serves as a kind of report card for motorists, taxpayers, and legislators. ([www.reason.org/ps360.pdf](http://www.reason.org/ps360.pdf))

The other study is part of Reason's Galvin Project to End Congestion (formerly the Galvin Mobility Project). "Why Mobility Matters to Personal Life" is an engaging effort by my colleague Ted Balaker to explain the social consequences of serious traffic congestion—on everyday matters such as dating, married life, family life, and recreation. If you've ever despaired of getting policymakers, editorial writers, or just concerned citizens motivated to make reducing congestion a priority, give this highly readable policy brief a try. It draws on the popular book Ted and colleague Sam Staley published last year, *The Road More Traveled*. Lots of people have been purchasing that book in quantity to give to transportation agency board members, members of legislative transportation committees, etc. But as engaging and informative as that book is, it's still a book-length treatment. For an introduction to one of its key themes, you can't beat Ted's new policy brief. ([www.reason.org/pb62.pdf](http://www.reason.org/pb62.pdf))

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## News Notes

**Two New BRT Resources.** The Transportation Research Board has published two useful documents on bus rapid transit. One is a detailed guidebook, "Bus Rapid Transit Practitioner's Guide." Go to: [www.trb.org/news/blurb\\_detail.asp?id=7848](http://www.trb.org/news/blurb_detail.asp?id=7848). The other deals with the kind of problem experienced by LA's Orange Line; its title is "Design, Operation, and Safety of At-Grade Crossings of Exclusive Busways." For this one, go to: [www.trb.org/news/blurb\\_detail.asp?id=7850](http://www.trb.org/news/blurb_detail.asp?id=7850).

**Correction re Bay Area Freeway Repair.** In [last month's issue](#), I wrote about the use by Caltrans of an incentive contract to speed the replacement of a key bridge on the San Francisco Bay Area freeway system. But some of the details I reported were incorrect. According to *Engineering News-Record* (June 4, 2007), contractor C.C. Myers actually finished 32 days early and earned the maximum bonus of \$5 million; that's even more impressive performance than what my earlier information suggested.

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## Quotable Quote

"If we're stuck in some particularly frustrating traffic jam, we might erupt in anger. But most of the time we just surrender a little bit more because we assume degraded mobility is the natural result of an increase in population and driving. Rarely do public officials seek to undo such feelings of

surrender. Most planning agencies have decided they will not even attempt to reduce congestion—they only aim to reduce its growth. Yet if such a plan were applied to a different policy area, Americans would not stand for it. Imagine if our leaders told us that, in the future, our education system would get worse, there's nothing we can do about it, and that all they hope to do is make test scores fall more slowly."

--Ted Balaker, "Why Mobility Matters to Personal Life," Reason Policy Brief No. 62, July 2007

"The question remains, however, about how best to use the money to alleviate growing traffic congestion that robs commuters of their time, money, and patience. In most instances, the answer to better traffic flow is to provide greater highway capacity for motor vehicles. . . . California also needs to consider building new highways in selected areas. In the 1960s, many freeways were planned and later cancelled, leading eventually to the congestion we have today. . . . For nearly three decades, California has lagged behind much of the nation in improving its highway system. We are finally trying to catch up, and it will take many years to make real improvements. But it will take even longer if transportation money is not wisely allocated, and that means most of it going toward increased highway capacity."

--*Contra Costa Times*, June 20, 2007