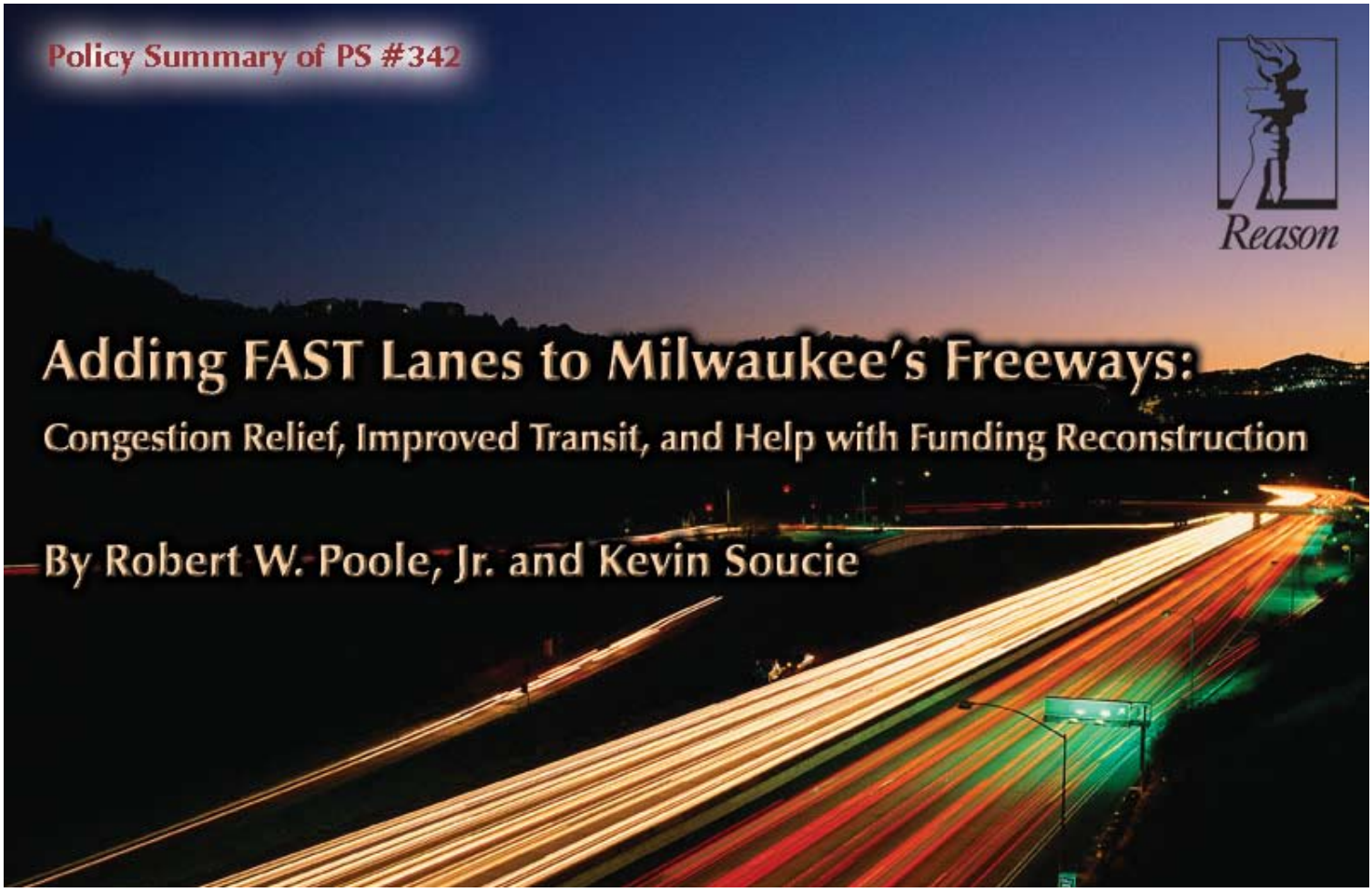


THE NEED FOR A NEW PLAN

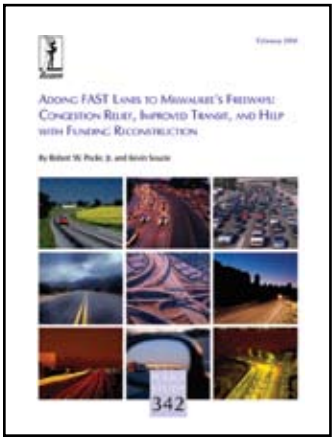
The Southeastern Wisconsin freeway system has grown increasingly congested since it was built in the 1960s and 1970s. The Southeastern Wisconsin Regional Planning Commission (SEWRPC) reports that in 1972, only 9.1 miles (or 5.6 percent) of the system suffered from congestion during rush hours, but by 1999 this had grown to 64.7 miles (or nearly one-fourth of the entire system), affecting not only commuter vehicles, but transit and emergency vehicles as well. The cost of motorists' wasted time and fuel averages $310 per person per year and is expected to grow significantly in coming years.

Freeway congestion has had a devastating impact on bus service and has severely hindered transit's time-savings competitiveness with the automobile. "Freeway Flyers," stuck in the same traffic jams as cars, have lost their "express bus" advantage as an alternative for commuters. As a result, transit continues to lose commuter market share, circling down the death spiral of service cuts and fare increases.

One seldom discussed cost of freeway congestion is the greatly reduced ability of emergency vehicles (police, fire, paramedic) to get where they need to go rapidly and reliably. In responding to life-threatening emergencies, every second counts. Yet congested freeway lanes may make it impossible for these public safety vehicles to get through when they are urgently needed.

Current plans call for rebuilding and modernizing the Southeastern Wisconsin freeway system, at a cost of $6.2 billion. The plans include the addition of one lane in

This is a companion brief to *Adding Fast Lanes to Milwaukee's Freeways: Congestion Relief, Improved Transit, and Help with Funding Reconstruction*, Robert W. Poole, Jr. and Kevin Soucie, reason.org/ps342.pdf



each direction, aimed at relieving current and future congestion. But a growing number of transportation planners have begun to rethink the addition of regular ("general-purpose") lanes to freeways. These planners recognize the need for additional capacity, but are also struck by:

- The tendency of continued growth to fill up the new lanes over time;
- The high cost, political opposition, and limited right of way available for any further freeway widening after this one;
- The desire to provide congestion relief that will be longer-lasting (or more "sustainable" over time).

These concerns have led to increased support for configuring new lanes not as traditional general-purpose lanes but as some form of "managed lanes." The underlying idea is that since we cannot afford to keep on adding lanes indefinitely, it makes sense to get higher value out of the lane additions that we do make. What kind of higher value are they talking about?

AN OVERVIEW OF MANAGED LANES

The earliest special-purpose lanes were carpool lanes, generally known as high occupancy vehicle (HOV lanes). The idea was to have these new lanes carry more people per hour, by permitting only vehicles with multiple occupants to use them. While a few HOV lanes carry more people per hour at rush hour than regular lanes, most end up with significant excess capacity (sometimes called the "empty lane syndrome"). There are no current plans to make use of HOV lanes in the Milwaukee area, and in our view, this is just as well, since other forms of specialized lanes can provide much greater value and transportation benefits.

The second type of "managed" lanes, HOT lanes, has been far more successful. As first proposed in 1993, the idea was that since a typical HOV lane has considerable excess capacity, the extra capacity could be sold to those willing to pay a market price for a faster trip when they are in a pinch, bypassing congestion on the regular lanes. Two different versions of the idea were implemented in California during the 1990s. In San Diego on I-15, underutilized HOV lanes were converted to HOT lanes. And in Orange County on SR 91, brand new HOT lanes were added to the median of this very congested freeway. Both California projects have been extensively studied since opening in the mid-1990s. Several broad conclusions have emerged.

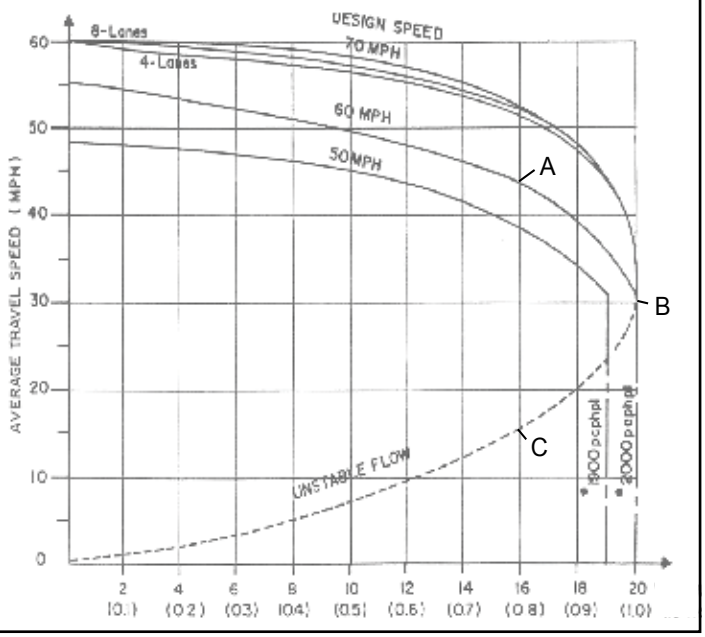
First, charging prices that are higher when demand is greatest works effectively to keep the HOT lanes from getting overloaded during rush hours. Thus, pricing keeps the HOT lanes free-flowing, letting them function as a kind of safety valve on the freeway. That means all kinds of time-sensitive trips have new alternatives not possible without these special lanes: emergency vehicles, transit buses, delivery vans, as well as ordinary travellers with trips that absolutely, positively have to be made on time.

Second, on both projects the data show that the large majority of users are not five-day-a-week regular users. For example, the 91 Express Lanes have issued 176,000 windshield-mounted transponders to 115,000 account-holders. But on any given weekday, only about 30,000 individuals use those lanes. What most people do is to use the HOT lanes as a kind of "congestion insurance." You open an account and put the transponder on your windshield so that you have the option of using the HOT lanes on those occasions when you really need to get somewhere on time, and it's worth paying to do so. This accounts for the fact that there is significant usage of the HOT lanes, in both counties, by people in the lowest 25 percent of the income distribution.

The underlying idea is that since we cannot afford to keep on adding lanes indefinitely, it makes sense to get higher value out of the lane additions that we do make.

Third, because of the nature of severe congestion, at rush hours the HOT lanes actually have much higher performance (vehicle throughput) than the general-purpose lanes. Figure 1 shows the relationship between speed and throughput. Before the rush hours, low volumes of traffic are zipping along at the speed limit (point A). As traffic volumes increase, speeds begin to decrease, until the maximum flow-rate of the lane is reached (at anywhere from 1800 to 2000 vehicles/hour, depending on the lane configuration), shown as point B. Beyond that point, cars get too close together, and people start hitting their brakes to keep a safer distance. That typically leads to a cascade of slowdowns, in which traffic becomes "chaotic" and flow breaks down into stop-and-go conditions (point C), with volumes becoming less and less as speed also decreases. Traffic stuck in this kind of chaotic condition can sometimes take an hour or more to recover (on severely congested freeways).

Figure 1: Traffic Throughput vs. Speed



What pricing does is to keep traffic flowing at or near the sweet spot shown by point B, at high speeds and nearly maximum flow. The idea is to prevent overcrowding of the priced lanes during rush hour, so as to maintain conditions at point B, thereby preventing breakdown into unstable conditions of both low speed and low flow. Because pricing has been proven to do this on the two California projects, we now have real data showing the superior throughput of priced lanes at rush hour. On the 91 Express Lanes, at the busiest times, those two lanes handle 49 percent of the throughput despite being only 33 percent of the total lane capacity (two out of six lanes in each direction).

DESIGN CONSIDERATIONS

By definition, access to priced lanes is restricted; hence, the lanes must be separated in some way from the adjacent general-purpose lanes. Methods of doing this vary. The HOT lanes on I-15 were originally built as a barrier-separated, reversible (i.e., operating in the peak direction only) facility. That remains their configuration today, and that will be the configuration of the expanded project now under construction. At the other end of the spectrum, a portion of the new HOT lanes project on I-394 in Minneapolis (also a conversion from HOV lanes) is separated only by a double white line on the pavement from the adjacent lanes. An intermediate approach is represented by the 91 Express Lanes in Orange County, which uses plastic pylons in addition to pavement striping to delineate the HOT lanes.

Another design consideration involves variable pricing. First, such pricing can only be done as-electronic toll collection. That means tollbooths cannot be used. There is no practical way to charge many different prices during the course of a day using cash toll payment. Second, prices must be allowed to increased over time, when necessary, to keep traffic flowing smoothly. On the 91 Express Lanes, the Orange County Transportation Authority has put in place a pricing policy that automatically increases the toll rate for a particular time block (e.g., between 3 PM and 4 PM on Thursdays) if traffic levels have been above a certain pre-congestion threshold during that time block for 12 weeks in a row. This policy is explained on the agency's Web site and is widely known. There is no need for a political decision, a meeting, or any other positive action in order to increase toll rates to manage traffic flow. Likewise, under the variable pricing regime in San Diego, a software algorithm makes a new pricing decision every six minutes, raising or lowering the toll rate for the next six minutes based on just-measured traffic levels.

Since priced lanes require 100 percent electronic tolling, all those who wish to use such lanes must open an account and acquire a transponder, which is mounted on the windshield. Since neighboring Illinois is in the process of making its toll system compatible with the increasingly standard E-ZPass system, now used across the Midwest and the Northeast, any such system in Milwaukee would be able to adopt that same transponder technology and make interoperability agreements with the E-ZPass consortium of toll agencies. Thus, Milwaukee-area users could use their transponders when they visited other states in those regions.

APPLYING FAST LANES TO MILWAUKEE

Based on the above discussion, we propose that in rebuilding the Milwaukee-area freeway system, the inner lanes on the core of the system be developed as priced lanes. In most cases, they would be a single lane in each direction (though on portions of the system where traffic flow is heavily directional, the new lanes could be developed as two-lane, reversible facilities). Separation would be via striping and plastic pylons. There would be real-time variable pricing

(as in San Diego and Minneapolis), done via all-electronic tolling at highway speed. The system would be compatible with, and interoperable with, E-ZPass. All vehicles using the new lanes would be charged, except for emergency vehicles, buses, and employer-sponsored vanpools.

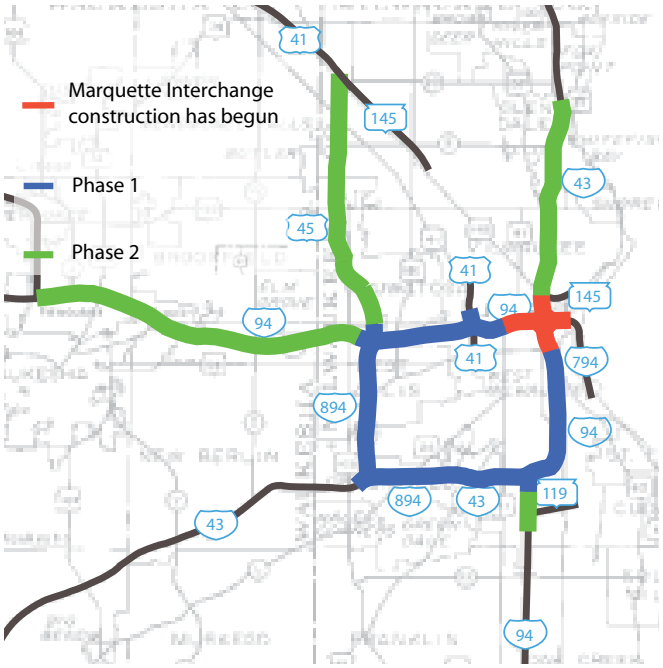
This report proposes that the FAST lanes be implemented instead of new general-purpose (GP) lanes on the most congested core portion of the rebuilt freeway system. The FAST Lanes system would encompass the approaches to downtown on I-94 from the south and from the west, on I-43 and US 45 from the north, plus the inner core of freeways near downtown (I-894 and I-94/43 north-south, and I-94 and I-43 east-west). This is the portion of the freeway system where congestion is projected to be worst, even after the widening. It is consequently the area where relief is most needed and where willingness to pay to avoid congestion will be greatest. Our proposed construction phasing of the FAST Lanes is designed to get the highest revenue-producing segments in operation first.

FAST Lanes assure motorists that no matter how bad traffic gets, they will always have a relief-valve available when they really need it. Some have begun to call this concept "congestion insurance." Just as people purchase insurance to guard them against life's other hazards (fire, theft, accidents), with a network of FAST Lanes they will be able to purchase insurance to guard them against being late. The initial cost of this "insurance" is very low: simply the cost of opening an account and installing a transponder on the car's windshield. From that point on, account-holders have the peace of mind that whenever they are running late and really need to be somewhere on time, they have a means of buying that faster trip for a price that is lower than the cost of being late. This will always be true since it will be the individual driver who chooses whether or not to pay for a specific trip.

TRAFFIC AND REVENUE PROJECTIONS

SEWRPC provided traffic figures for each segment of the freeway, giving the range of average daily traffic (ADT) along each segment for 1999 and the projected level for 2020. We calculated the annual traffic growth rate implied for each segment, which ranged from a low of 1.15 percent to a high of 1.9 percent. Using these annual growth rates, we projected annual traffic on each segment from 1999 through 2045.

Figure 2: Map of Proposed FAST Lanes Network



Drawing on the California experience, and scaling down the California toll rates to match Milwaukee's less-intense congestion levels, we projected annual revenues from the proposed set of FAST lanes, from 2013 (when the first set of lanes would open) through 2045. The average peak-hour charge was assumed to be 15 cents per mile (2005 dollars), adjusted annually by the rate of inflation. Overall, drawing on feedback from those experienced with toll revenue bond financing, we estimated that the projected toll revenues would support the issuance of about $1 billion in toll revenue bonds. SEWRPC puts the incremental cost of the lane additions for this portion of the freeway system at $565 million. Thus, toll revenue bonding should produce more than enough funding to pay for these lane additions, while making an additional contribution toward the overall $6.2 billion cost of the entire freeway rebuilding program.

One important point to remember here is that if the fourth-laning of these freeway segments were done by adding GP lanes instead of FAST Lanes, those new GP lanes would become seriously congested around 2040, without relief, whereas the FAST Lanes will remain uncongested on an ongoing basis, thanks to the use of pricing. That means a FAST Lanes fourth-laning is more sustainable than GP-lanes fourth-laning. It ends the struggle we face to continually try to build our way out of traffic congestion. And the benefits will continue on a long-term basis.

TRANSIT, PARATRANSIT, AND EMERGENCY VEHICLE BENEFITS

Additionally, since pricing keeps traffic in the FAST Lanes flowing at or near the speed limit during rush hours, these lanes, in effect, would function as virtual exclusive busways (VEBs). They would give the transit agency reliable, uncongested guideways on which it can operate sustainable, high-speed express bus service. The reduced bus travel times would make transit a more attractive alternative for travel to employment, educational, medical, shopping and cultural destinations in the region.

Some of the current freeway bus service is near or at full capacity; therefore, any increase in ridership would be accompanied by an increase in service. However, the stronger demand brought by greater time savings through using FAST Lanes would mean that the farebox could support a higher percentage of the costs than the service without FAST Lanes. The greatest benefit would accrue to bus routes that are running well below capacity and are threatened with elimination. The increased rider demand brought by the improved time value means that the very same service would generate new revenue without an increase in operating costs. Also, taxis, dial-a-ride-vans, and vanpools would also become more competitive with driving alone by being able to offer meaningful time savings on the core of the freeway system.

Vanpools are an especially attractive opportunity. The term generally means a shared-ride van, typically organized by an employer, carrying from 8 to 15 people. Some types of priced lanes permit paratransit (taxis and vans), as well as buses, to use the facility at no charge. But even a $4 toll spread among eight people would be only 50 cents apiece, for a much faster trip. Vanpools can meet a need for "many to one" service (a number of pickup points but terminating at a single destination workplace) more flexibly than conventional bus service.

One seldom discussed costs of freeway congestion is the greatly reduced ability of emergency vehicles (police, fire, paramedic) to get where they need to go rapidly and reliably. In responding to life-threatening emergencies, every second counts. Yet congested freeway lanes may make it impossible for these public safety vehicles to get through when they are urgently needed.

CONCLUSION

We estimate that the toll revenues from the FAST Lanes would be sufficient to support a revenue bond issue of about $1 billion, which would make a sizeable contribution toward the $6.2 billion cost of reconstructing the entire freeway system.

Adding FAST lanes rather than general-purpose lanes would provide sustained congestion relief, giving all southeastern Wisconsin motorists the opportunity to obtain "congestion insurance" despite continued growth in overall traffic levels. Doing so would also make possible significantly better express bus and paratransit service, using the new lanes, and would also ensure that emergency vehicles always had an uncongested route to use.

The recently enacted federal SAFETEA-LU legislation provides a program under which states are encouraged to add priced lanes to Interstate highway facilities. Under the Express Toll Lanes pilot program, up to 15 such projects may be carried out anywhere in the United States, despite the general prohibition on charging tolls on the Interstates. Thus, Congress has declared that projects such as the proposed FAST Lanes are sound transportation policy. ■

ABOUT THE AUTHORS

Robert W. Poole, Jr. is Director of Transportation Studies at Reason Foundation. He received his B.S. and M.S. in engineering from MIT and worked in aerospace before launching Reason Foundation in 1978. He has advised the U.S., California, and Florida departments of transportation, as well as the Reagan, Bush, Clinton, and Bush White Houses on transportation policy issues. He was a member of California's Commission on Transportation Investment in 1995-96.

Kevin Soucie is a consultant on transportation policy and government affairs with Soucie & Associates, based in Milwaukee. He received his B.A. in economics and political science from McGill University and his M.A. in urban planning from the University of Wisconsin, Milwaukee. He was elected to three terms in the Wisconsin Assembly from 1974 through 1980, and chaired its transportation committee during his third term. He served as Director of Intergovernmental Affairs for Milwaukee County from 1989 through 1992. His transportation consulting work has encompassed freight rail, highways, and urban transit issues. He has chaired the Milwaukee City Transportation Commission and been a member of the Milwaukee City Plan Commission.

RELATED STUDIES

Robert W. Poole, Jr. and Ted Balaker, *Virtual Exclusive Busways: Improving Urban Transit while Relieving Congestion*, Policy Study No. 337, September 2005.

Robert W. Poole, Jr., Peter Samuel, and Brian F. Chase, *Building for the Future: Easing California's Transportation Crisis with Tolls and Public-Private Partnerships*, Policy Study No. 324, January 2005.

Robert W. Poole, Jr. and C. Kenneth Orski, *HOT Networks: A New Plan for Congestion Relief and Better Transit*, Policy Study No. 305, February 2003.

Robert W. Poole, Jr. and Kevin Soucie, *Rebuilding the Marquette Interchange Via a Public-Private Partnership*, No. 304, January 2003.

Peter Samuel and Robert W. Poole, Jr., *Putting Customers in the Driver's Seat: The Case for Tolls*, No. 274, September 2000.

Robert W. Poole, Jr. and C. Kenneth Orski, *Building a Case For HOT Lanes: A New Approach to Reducing Urban Highway Congestion,* No. 257, April 1999.

THE MOBILITY PROJECT

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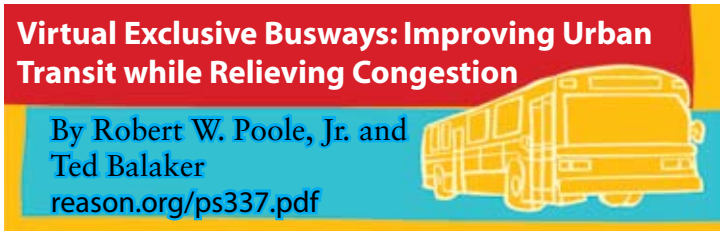
The Reason Foundation would like to acknowledge and express appreciation for the support of the Bradley Foundation for this project.



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