



Improving Mobility Without Building More Lanes

By Mike Salisbury and Will Toor
July 2017



Photo: Courtesy of the Denver Post

Anyone who travels on highways in the Front Range knows that congestion is a major problem in the Denver metro area (Figure 1, below text) and, based on expected population growth (Figure 2) over the next 30 years, it's only going to get worse.

The traditional solution, expanding the highway network to relieve congestion and accommodate additional demand, is both unaffordable and ineffective. The Colorado Department of



Transportation has said it needs an additional \$1 billion per year to maintain and expand the existing highway network, but the department's main source of revenue, motor fuel taxes, actually is losing value because of inflation. Between 1993 (when Colorado last raised its gas tax) and 2015, the nominal value of the money CDOT collected rose by about \$200 million dollars, but in *real value* the revenue has actually decreased by \$21 million (Figure 3). The high cost of highway expansion makes it difficult to add lanes in a time of declining funding. Figure 4 shows the cost of recent highway expansions in the Denver metro area.

Colorado leaders have proposed ways to raise more money for transportation, but the efforts have fallen short. In 2017, the state legislature came close to passing

House Bill 1242, which would have raised sales taxes to invest in roads, public transit and bicycle and pedestrian infrastructure. But even if this measure had passed, the revenue for roads would have been only one third of the amount that CDOT says it needs. So, adding new lanes to all of our congested highways seem politically unachievable.

Even if Colorado could find significant new revenues to expand its highways, the added lanes and routes would not untangle metro Denver's congestion. Multiple studies show that while increasing highway capacity might temporarily reduce congestion, in the long run it only encourages more people to drive until congestion returns to high levels.

One compelling example is the \$1.67 billion Transportation Expansion Project, commonly called T-REX, which expanded Interstate 25 and added transit service parallel to the highway through southeast metro Denver. The project started in 2001, finished in 2006, but just four years later – in 2010 – congestion had returned to the level experienced before construction began. (Figure 5). The accompanying rail line provides a fast, uncongested trip for many travelers, but the highway expansion had no long-term benefit in reduced congestion according to CDOT's congestion measurements.

Unfortunately, here's what I-25 looks like much of the time, despite the lanes added by the T-REX project. Photo: Courtesy of the Denver Post/ Getty Images, by Andy Cross



What if there was a way to increase mobility on the existing road, and improve transit and other options, without needing more public funds? This sounds like magic, but it really just requires a smart approach to using market forces to optimize the use of our existing highway lanes.

The idea actually is very simple: Convert some existing highway lanes into high-occupancy toll (HOT) lanes. This relatively low-cost alternative can ensure a congestion-free travel option. The change takes less time to implement than adding entirely new lanes, and certainly costs far less money. Benefits can be maximized by using the revenue generated by the tolls to invest in improved access to public transit, expanding and upgrading biking and walking infrastructure, and additional alternatives such as carpools and vanpools.

Conversion of existing lanes to managed lanes, along with aggressive promotion of alternatives to driving alone, will give travelers more choices, without increasing congestion in the remaining general purpose lanes, all at much lower cost than trying to expand the highway.

Colorado leaders have tried something very similar along U.S. 36 between Boulder and Denver, where the state added a high-occupancy travel (HOT) lane linking two key parts of the metro area, while the Regional Transportation District provides high-quality, rapid bus service with buses leaving every six minutes during rush hour or other peak travel periods. In this project, HOT lanes were created by widening the highway, not converting an existing lane.

Vehicles with three or more occupants can use the HOT lanes for free, while cars with only one or two occupants pay reasonable use fees. Automatic devices collect information to assess the fees either by reading license plates or transponders of vehicles traveling the HOT lanes. Money from the HOT fees has helped fund the project. Travel along U.S. 36 has become much smoother and faster despite rapid population growth, particularly in Boulder County.

Travel along U.S. 36 between Boulder and Denver's near suburbs has become quicker and easier with the use of HOT/ managed lanes. Note the popular express bus, called the Flatiron Flyer, in the lane directly approaching the camera. Photo: Courtesy of HDR Inc.



But it is expensive to add new lanes, and in many places physical constraints make it almost impossible. Other Front Range locations should examine the approach of incorporating HOT lanes on existing roads. Ironically, despite its recent expansion, a top candidate is I-25 through the T-REX area because of the severe congestion, and no realistic options to further expand the highway that now is hemmed in by large concrete walls and a rail line, much of it bordered by expensive commercial properties.

As part of a companion [white paper](#)¹, SWEEP analyzed this section of I-25 and found that there could be significant benefits from converting one lane in each direction to a HOT lane, then investing the revenue in transit passes and connections to transit particularly for the first and final miles of popular commuter routes. This win-win approach would give drivers access to HOT lanes where congestion would be greatly reduced. It further would allow more people to use additional, affordable, effective and efficient transit instead of driving. Meanwhile, traffic in the remaining “free” lanes would be no

¹ Salisbury and Toor. 2017. Managed Lanes and Other Strategies to Improve Mobility on the I-25 South Corridor.

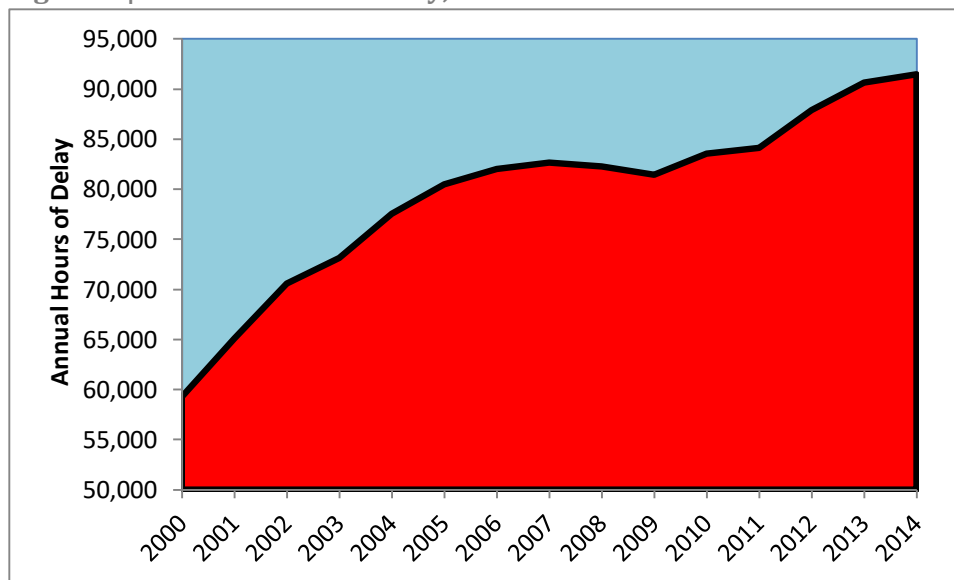
worse than before the changes. This method optimizes the use of the existing highway, and will give travelers new options that will save them time, whether they choose to pay a toll when they are in a rush, or take the train because there are now better first- and final-mile connections to the transit stations.

This approach should appeal across the political spectrum. For conservatives, the plan minimizes expenditures of tax money and uses market forces to manage congestion. For those on the left, this approach also would increase transit use, avoid environmental impacts and give low-income commuters better access to transit. In a world of extremely limited transportation funds, it should appeal to officials trying to manage limited budgets by make the best use of existing infrastructure.

Maybe it is time to try something new.

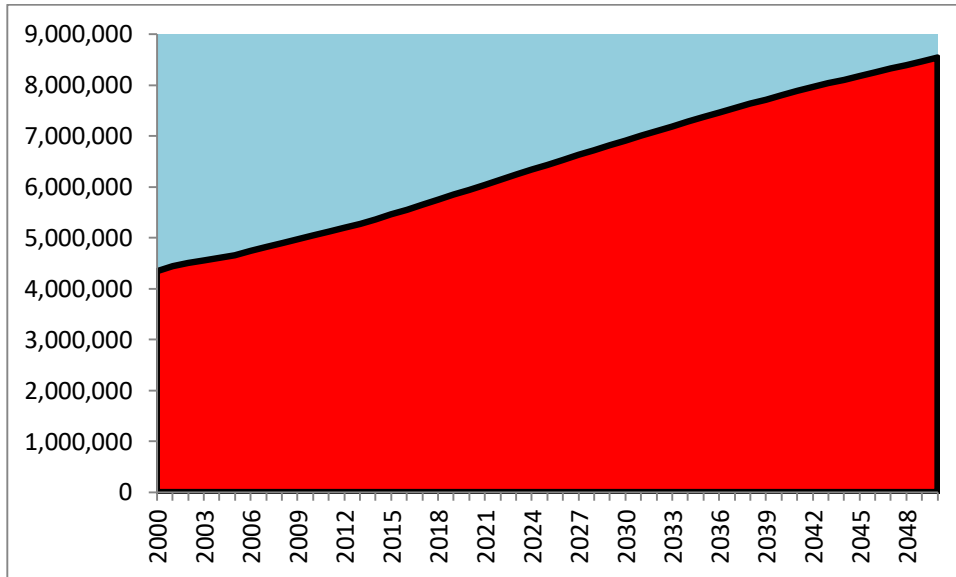
This U.S. Department of Transportation video illustrates the intensity and complexity of adding new lanes to Interstate 25 through southeast metro Denver, known as the T-REX project. Lack of funds and the high cost of acquiring more land for right-of-ways make adding even more lanes cost-prohibitive.
<https://www.youtube.com/watch?v=1PnWbXnnr4g>

Figure 1 | Annual Hours of Delay, Denver-Aurora²



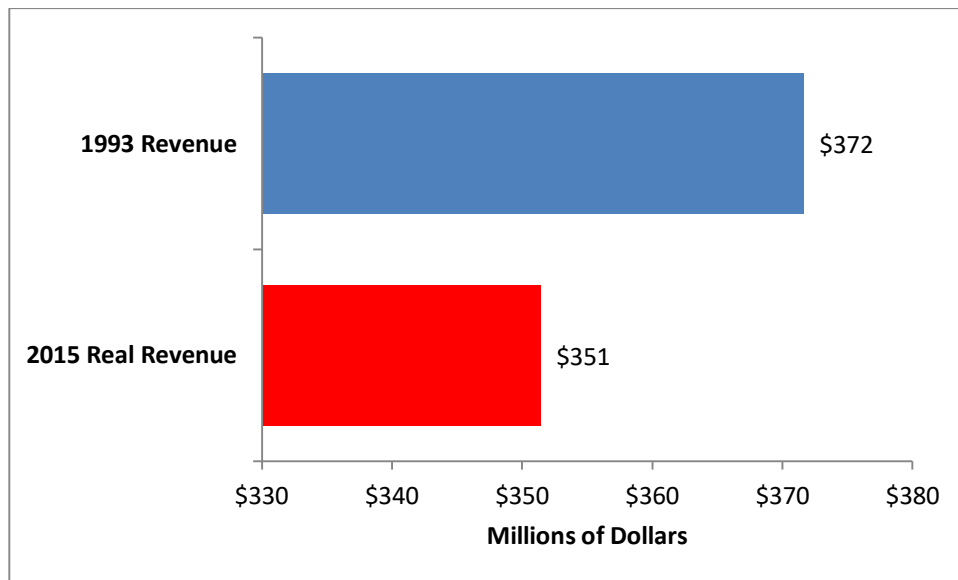
² Texas A&M Transportation Institute. 2015. Annual Urban Mobility Scorecard. <https://mobility.tamu.edu/ums/>

Figure 2 | Colorado Population, 2000-2050³



³ Colorado State Demography Office. 2017. Population Forecasts.
<https://demography.dola.colorado.gov/population/population-totals-colorado-substate/#population-totals-for-colorado-and-sub-state-regions>

Figure 3 | Colorado State Motor Fuel Taxes in Real Dollars, 1993 and 2015⁴

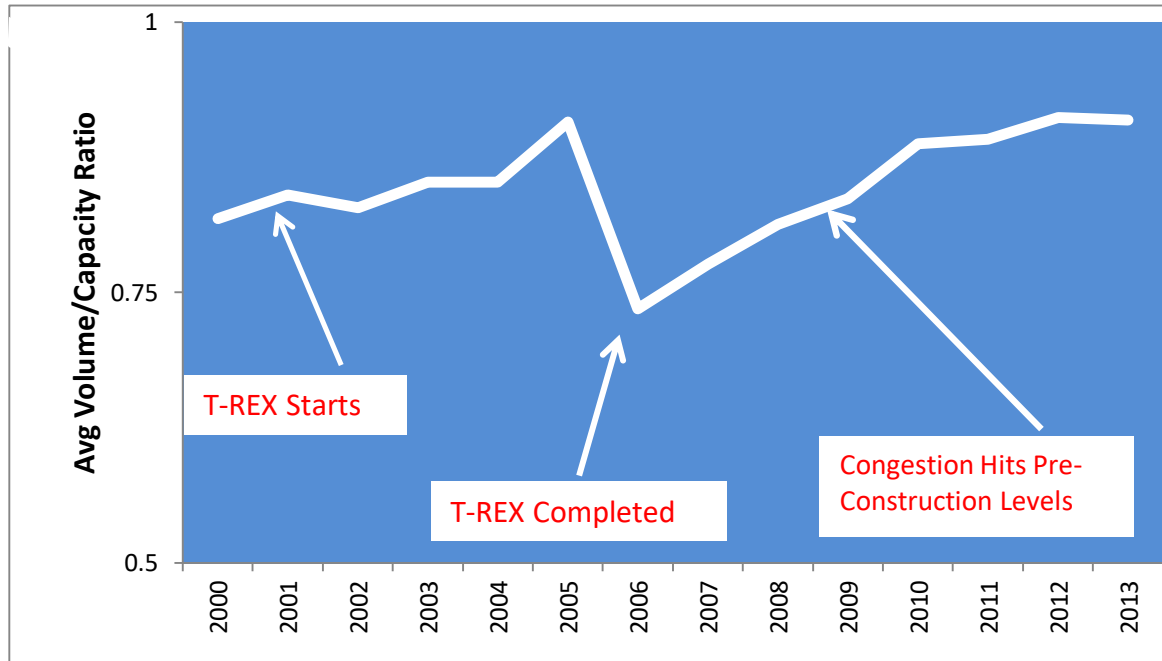


⁴ Federal Highway Administration. Highway Statistics. 1993 and 2015. Table SF-1 Motor Fuel Taxes. <https://www.fhwa.dot.gov/policyinformation/statistics.cfm> and US Inflation Calculator. 2017. Inflation Calculator. <http://www.usinflationcalculator.com/>

Figure 4 | Managed Lanes and Interstate Expansion Costs in the Denver Metro Area



Figure 5 | Congestion on the T-REX Corridor⁵



⁵ Volume/Capacity Ratio data was obtained for the entire corridor from CDOT.