



Reason

Reason Foundation
Policy Study No. 446
July 2015

Truck-Friendly Tolls for 21st Century Interstates

by Robert W. Poole, Jr.



Reason Foundation



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Executive Summary

Of all highway users, the trucking industry has the most at stake in ensuring a solid future for the Interstate highway system. Together with the other principal routes that comprise the National Highway System, the 47,000 miles of Interstate are for trucking companies what the air traffic control system is for airlines—their primary arteries of commerce. The importance of the Interstates will be even greater in coming decades, since the U.S. DOT forecasts there will be 40% more trucks on the road by 2045.

But the continued viability of the Interstates is now in question. These vital arteries were constructed largely in the 1960s and 1970s with a 50-year design life. Over the next two decades, most Interstates will exceed their design lives and will need to be reconstructed—their original pavement *replaced*, not just resurfaced. In addition, the projected increase in traffic—especially truck traffic—means that many of these corridors will require additional lanes over the next two decades.

A detailed 2013 study by Reason Foundation estimated the cost of replacing all 47,000 miles of Interstates, along with selective widening, at just under \$1 trillion (net present value over 20 years). There is no identified funding source for this huge array of mega-projects. The Reason study also analyzed the potential feasibility of financing the entire Interstate replacement/modernization program via all-electronic tolling, at rates lower than those typically charged on legacy toll roads such as the Pennsylvania Turnpike. The results showed that most states could finance the replacement and selective widening of their long-distance Interstates with tolls of 3.5 cents/mile for cars and other light vehicles and 14 cents/mile for large trucks, as long as those toll rates were indexed for inflation.

This study addresses the question of whether there is a value proposition for the trucking industry in supporting such an “Interstate 2.0” endeavor. For understandable reasons, this industry has a long history of opposition to tolling, objecting to “double taxation” (paying both tolls and fuel taxes for the same highway) and to toll roads often being used by governments as “cash cows” (charging far more than needed to cover the capital and operating costs of the toll road, and diverting the excess revenue to other purposes).

First, the study reviews two other ways of increasing investment in major highways that have been advocated by the trucking industry, for example an across-the-board increase in federal gasoline and diesel taxes (such as 15 cents/gallon combined with inflation indexing). But that revenue would very likely be spread across all the myriad programs currently supported by the Highway Trust Fund, diverting most of it away from major highways such as the Interstates. Indeed, data recently published by the Government Accountability Office reveal that only about 6% of that \$50 billion a year program is actually spent on “major” highway and bridge projects.

The trucking industry has also supported an increase in just the diesel tax, with the proceeds dedicated to a new highway freight program. One problem with this approach is the difficulty of making that tax increase fair to the rising number of motorists purchasing fuel-efficient diesel cars and pickup trucks for local use, as well as numerous local service trucks (dump trucks, garbage trucks, cement mixers, etc.) that are not primarily used on Interstate highways. Moreover, an assessment by the National Cooperative Freight Research Program estimated that if such a dedicated diesel tax were large enough to fund Interstate reconstruction mega-projects, the increased diesel cost would lead to significant changes in truck propulsion over time (conversions to gasoline and natural gas) and even some shifts from truck to rail—the net effects of which could dramatically reduce the revenue generated for the new infrastructure fund.

Next, the study describes how 21st century all-electronic tolling is already being used by the trucking industry, especially in the East and Midwest where many Interstates are tolled by legacy toll agencies. Two service providers, both endorsed by the American Trucking Associations, provide consolidated toll collection and billing services for trucks that pay tolls electronically via the 15-state E-ZPass system. A truck using one of these services (Bestpass or PrePass Plus) needs only a single transponder to pay tolls electronically in all 15 of those states. The trucking company receives a single consolidated bill for all tolls on all toll roads used during each month.

Major efforts are under way by the toll industry to provide *nationwide* tolling “interoperability” by 2016. Thereafter, providers like Bestpass and PrePass Plus will be able to offer a single transponder and consolidated billing nationwide, as they already do in the 15 E-ZPass states.

The study also provides a fresh look at the cost of toll collection in systems designed from the outset for all-electronic, transponder-based tolling. It cites the results of a 2012 study of three small toll agencies that serve mostly suburban motorists, using all-electronic tolling with a simplified business model. Instead of the widely accepted figure from 20th century (mostly cash) tolling that toll collection consumes 20 to 30% of the toll revenues, this small systems' transponder toll collection needs only between 4% and 10% of revenues. That figure is arrived at by dividing collection costs by total toll revenue. But those three small suburban toll agencies' revenues come almost entirely from cars, which typically pay one-third to one-fourth as much as heavy trucks. On a long-distance Interstate, with a typical mix of cars and trucks, an example in the study estimates transponder toll collection costs of just 4 to 5% of revenue.

The study also addresses concerns raised by the trucking industry about greater use of tolling, including:

- Confidentiality of routing and billing information;
- Being able to pass through toll charges to shippers;
- Predictable toll rates;
- Different rates on every highway; and,
- Cost compared with current tolls and taxes.

On the latter point, the study estimates that heavy trucks today pay, via diesel taxes, about 7.2 cents/mile on non-tolled Interstates. That amount is markedly insufficient to pay for reconstruction and widening of the Interstates. On the replacement Interstates, using toll rates from the Interstate 2.0 study and with rebates of current diesel taxes, the toll cost would be 14 cents/mile—nearly double the diesel tax rate, but sufficient to pay for the reconstruction and widening. That is only half of what trucks are paying today on *legacy* tolled Interstates—an average of 27.1 cents/mile in diesel tax plus tolls.

The study next addresses the major question of how highway users—motorists and truckers alike—could be guaranteed that a toll-financed program to replace aging Interstates with a 21st century version would deliver value for money. That would require that the tolls be true user fees, limited by law to covering only the capital and operating costs of the replacement facilities. It proposes a double set of guarantees: federal enabling legislation plus corresponding state enabling legislation that would:

1. Limit the use of the toll revenues to the newly tolled facilities;
2. Charge only enough to cover the full capital and operating costs of the tolled facilities;

3. Begin tolling only after a facility (or major portion thereof) is completed and open to traffic; and,
4. Use tolls *instead of*, rather than in addition to, current state fuel taxes.

Currently federal law prohibits states from imposing tolls on “existing” Interstates, but the law includes a pilot program that allows three states to each reconstruct (i.e., replace) a single Interstate using toll financing. Although Missouri, North Carolina, and Virginia each holds a slot in the pilot program, none has yet achieved political consensus on making use of it.

The study proposes expanding the pilot program while strengthening its protections for highway users. The pilot should be expanded to more states to increase the likelihood of one or more states working out a political consensus that includes highway users. A use-it-or-lose-it provision would prevent a state from holding a slot indefinitely without using it. In addition, a participating state would be allowed to put forth a plan to replace *all* its Interstates via this approach, to avoid geographic inequities across the state.

But most important, the current program’s weak protections for highway users must be strengthened based on the four principles listed above. And to be accepted into the pilot program, a state would have to enact its own enabling legislation agreeing to those user-friendly provisions.

Congress could include these revisions to the pilot program in the current bill to reauthorize the federal highway and transit program. Highway user groups, including trucking organizations, should join with auto clubs in supporting such revisions.

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Part 1

Introduction

Trucking is America's primary means of goods movement. In 2014, trucks carried 69% of all freight tonnage and 80% of the dollar value of all freight moved within the United States. And despite some Administration talk about shifting more freight from trucks to railroads, the U.S. DOT's 30-year transportation forecast predicts there will be 40% more trucks on the road by 2045.¹ A more detailed analysis produced by the Federal Highway Administration's Freight Analysis Framework projects that the *value* of truck freight will increase 93% by 2040.²

The 47,000 route-miles of the Interstate Highway System, plus 113,000 route-miles of other major highways, constitute the National Highway System (NHS). The NHS provides the basic arteries on which the flow of goods depends. Yet the continued quality and capacity of that vital infrastructure cannot be assumed to be there when needed in coming decades.

The Interstates had a design life of 50 years when built, largely in the 1960s and 1970s. The oldest corridors have already exceeded that age, and most of the rest will reach that point and need reconstruction over the next two decades. Estimates of the cost of replacing this infrastructure range between \$1 trillion and \$2 trillion, depending on assumptions. Yet no funding source has been identified for this huge set of needed mega-projects.

Moreover, the existing system is plagued by chronic congestion, most notably in urban areas where obsolete interchanges serve as major bottlenecks to efficient, reliable goods movement. The American Transportation Research Institute estimated that in 2013 congestion added \$9.2 billion to trucking operating costs, created 141 million hours of lost productivity, and left 51,293 truck drivers sitting idle for a working year. Truck congestion costs in California and Texas alone each exceeded \$1 billion in 2013.³

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This report begins with a vision of a second-generation Interstate highway system, capable of meeting the demands of the 21st century. It then reviews several possible ways to finance the replacement and modernization of existing Interstate corridors to serve future needs, especially those of the current and future trucking industry. In assessing a possible toll-financing approach, it reviews rapidly changing technology that could make 21st century tolling dramatically different from, and far more user-friendly than, cash-based 20th century tolling. It also discusses an array of concerns that must be addressed to make this approach workable for America's trucking industry.

Part 2

A Vision of 21st Century Trucking Infrastructure

Imagine that over the two-decade period from 2020 to 2040 America's aging and inadequate Interstate system is *entirely replaced*. Worn-out pavement is replaced via full-depth reconstruction using the latest durable pavement designs. Bottleneck interchanges are redesigned and replaced, as took place in 2007 with the \$676 million Springfield interchange replacement in northern Virginia and in 2008 with the \$810 million Marquette interchange replacement in Milwaukee, reducing urban congestion. Lanes are added in numerous corridors, based on detailed projections of light-vehicle and heavy-vehicle traffic through 2050. In corridors projected by FHWA's Freight Analysis Framework to have 40% or more truck traffic by 2040, our vision calls for some or all of the additional lanes to be *dedicated truck lanes*, with pavement and bridge designs capable of handling heavier truck configurations than previously permitted. On these corridors, triples and turnpike doubles can operate far beyond the limited routes on which they were allowed on the 20th century Interstates. These changes would reduce fuel consumption per ton-mile, enable each driver to haul considerably more freight, increase the lifespan of car-only lanes, and practically eliminate truck vs. car collisions and fatalities. Together, these productivity gains would make 21st century trucking greener and more competitive.

These 21st century Interstates would have their own dedicated funding source (separate from the Highway Trust Fund), ensuring that they are properly maintained for their entire design life, which could well exceed the 50-year design life of the original system.

Operated more as businesses than as bureaucracies, they would provide enhanced services to trucking customers, with conveniently located overnight parking facilities, weigh-in-motion systems, and no toll booths or toll plazas. A trucking company would receive a single monthly invoice for all user fees transactions nationwide. Trucks would be equipped with a single transponder usable everywhere in the country, facilitating bypass of weigh stations and inspection stations as well as enabling non-stop user fee payments.

Trucks would be equipped with a single transponder usable everywhere in the country.

The basics of this vision were outlined in a detailed Reason Foundation study called Interstate 2.0, released in 2013.⁴ That study analyzed data to calculate realistic estimates of the following three factors:

1. The cost, in 2010 dollars, of reconstructing (replacing) *all the existing lane-miles* of the Interstate highway system, both rural and urban;
2. The extent of needed widening (lane additions), for each specific Interstate highway in each of the 50 states, and an estimate of the cost of those lane additions;
3. An initial estimate of the feasibility of toll-financing the entire modernization effort, using toll rates aimed at covering only the capital and operating costs of those Interstates (i.e., with the tolls as pure user fees). Those toll rates would be *instead of* current fuel taxes.

Each of these analyses was carried out state by state using unit cost data from the Federal Highway Administration's HERS (Highway Economic Requirements System) database. HERS unit costs are provided separately for rural Interstates (taking into account flat, rolling and mountainous terrain) and urban Interstates (taking into account urban-area size). Separate traffic projections for light and heavy vehicles were developed for each state, using a methodology developed by the U.S. DOT's Volpe Center. Corridors we selected for dedicated truck lanes were based on detailed 2040 estimates of truck traffic for each Interstate facility in each state, provided by FHWA's Freight Analysis Framework.

Among the largest projected benefits was increased safety, with an estimated 95% reduction in car/truck crashes and an overall reduction in fatal crashes by two-thirds.

Reconstruction and widening were modeled as taking place over the two-decade period from 2020 to 2040. Since all the lanes on all the Interstates would be replaced by new lanes, tolls would be charged on all lanes, including lane additions. Traffic and revenue were projected through 2054. The basic modeling was done using starting toll rates for long-distance Interstates of 3.5¢/mile for light vehicles and 14¢/mile for heavy vehicles. (These rates compare with 2010 national averages on existing long-distance toll roads of 4.9¢/mile for cars and other light vehicles and 19.9¢/mile for heavy vehicles.) To avoid the problem experienced with fuel taxes of the revenues not keeping pace with inflation, the baseline toll rates were modeled as being CPI-adjusted, assuming an average annual CPI increase of 2.5%. (Once again, these toll rates were assumed to be *instead of* current state fuel taxes, not in addition to them.)

Dedicated Truck Lanes

The Interstate 2.0 study identified 11 major corridors as good candidates for dedicated truck lanes, defined as corridors that would reach or exceed 40% of total traffic as trucks between 2020 and 2040, as projected by FHWA's Freight Analysis Framework data. The specific corridors so identified were the following:

- I-10 from California to Mississippi
- I-30 in Texas and Arkansas
- I-40 from California to Tennessee
- I-65 in Tennessee, Kentucky and Indiana
- I-69 in Indiana
- I-70 from Missouri to Pennsylvania
- I-71 in Kentucky
- I-76 in Colorado
- I-80 from Nebraska to Ohio
- I-81 from Tennessee to Pennsylvania
- I-84 in Idaho

One of these corridors, I-70 from Kansas City on the west to the Ohio/Pennsylvania state line on the east, was the subject of a detailed feasibility study in 2008–2011, as a federal “Corridors of the Future” analysis. The Dedicated Truck Lanes Feasibility study found that the best alternative (highest benefit/cost ratio) for reconstructing that aging and mostly four-lane corridor was to reconstruct it as an eight-lane facility, with two dedicated truck lanes and two general purpose lanes each way.⁵ Among the largest projected benefits was increased safety, with an estimated 95% reduction in car/truck crashes and an overall reduction in fatal crashes by two-thirds. Given the estimated \$23.9 billion cost of the project over its full four-state length of 767 miles, the study concluded that tolls on *all vehicles* in the corridor was the only available option for funding the project. As of early 2015, Missouri Gov. Jay Nixon was seeking legislative approval for the Missouri portion of this project, which already has a 2009 Record of Decision for the eight-lane configuration. Missouri also holds one of the three slots in the federal pilot program for toll-financed Interstate reconstruction.



The basic test of toll feasibility was a comparison of the net present value (NPV) of toll revenue with the NPV of all construction/reconstruction costs. On a nationwide basis, the NPV of toll revenues (net of an assumed 15% for operating and maintenance costs) was \$974 billion. This compared with the NPV of all reconstruction and widening costs of \$983 billion. Thus, modest but inflation-adjusted toll rates appear to be capable of paying for the modernization *and O&M costs* of the proposed Interstate 2.0, as modeled.

In short, this vision of a dramatically improved 21st century Interstate system appears to be feasible, if an efficient and effective user-pays system to provide for its capital and operating costs gains acceptance from the highway user community, including in particular the trucking industry.

Part 3

Current Alternatives for Funding a Modernized Interstate System

As of 2015, there is no federal or state plan for reconstructing and widening the aging Interstate highway system. As this is written, Congress is yet again wrestling with how to avoid large reductions in federal highway and transit grants to states and transit agencies due to the declining revenues being generated by federal gasoline and diesel taxes, plus miscellaneous other highway user taxes. Since 2008, Congress has shifted over \$60 billion in general fund monies into the Highway Trust Fund (HTF) to avoid reductions in highway and transit spending. Given the intense pressures being placed on general fund monies and “discretionary” spending due to the 10-year sequester, there are serious concerns about whether such HTF bailouts can continue. Yet there is still little support in the House, Senate, or the White House for a meaningful increase in federal highway user taxes. Given this background condition, let’s examine three possible alternatives for funding Interstate modernization.

As of 2015, there is no federal or state plan for reconstructing and widening the aging Interstate highway system.

A. Increase in Federal Fuel Tax Rates

The trucking industry, along with highway construction interests (e.g., ARTBA, AGC and others), AAA and the U.S. Chamber of Commerce, continues to argue for measures such as an increase of 10–15¢/gallon in the gasoline and diesel tax rates. If we assume that such an increase were enacted as part of the 2015 reauthorization bill, how much funding would that provide *for Interstate reconstruction and widening*? The largest serious proposal is by Rep. Earl Blumenauer (D, OR) to increase the gasoline and diesel taxes by 15¢/gallon, phased in over three years and subsequently indexed to the CPI. An analysis by *Eno Transportation Weekly* found that over a 10-year period, that increase would keep the HTF solvent, even allowing a modest increase in spending over the Congressional Budget Office baseline—of about \$5 billion per year.⁶

A serious problem with this approach is that nearly every dollar raised by these fuel tax increases is already spoken for by the numerous constituencies that depend on each of the myriad programs funded by the highway and transit accounts of the HTF. To begin with, according to a recent analysis by the Government Accountability Office, only 81% of the \$50.7 billion FY 2013 HTF money was nominally allocated to highways and bridges; the balance supported the Federal Transit Administration, the Federal Motor Carrier Safety Administration, and the National Highway Traffic Safety Administration.⁷ Of the \$41 billion devoted to highways and bridges, GAO found that 47% is spent on roads, 17% on bridges, and 9% on “safety, enhancements, and other” (with nearly a quarter of that 9% devoted to sidewalks and bicycle trails, plus other enhancements like scenic beautification and historic preservation). That leaves another 27% split into project development (20%) and “other” (7%), which includes ferryboats, tunnel activities and the Vehicle Weight Enforcement Program.

From the above assessment, GAO concluded that of the entire \$50.7 billion Highway Trust Fund, only \$24.05 billion—*less than half*—is spent directly on roads and bridges. And those monies are spread over the *entire federal-aid highway system*, not just the key corridors of the National Highway System. The GAO report then drilled down to figure out how much of that \$24 billion is spent on “major projects” of the kind most likely to be for resurfacing, reconstructing or new construction on the NHS. The breakdown was as follows:

Reconstruction	\$1.590 billion
Resurfacing/rehabilitation	1.189
New construction	0.261
Project development	0.883
Safety improvements	0.328
Enhancements	0.070
Other	<u>0.278</u>
Total major projects:	\$4.599 billion

Only the first three categories, totaling \$3.04 billion, are actually spent on major highway and bridge *construction activity*. That is just 6% of the total Highway Trust Fund budget of \$50.7 billion.

Adding 10 or 15¢ per gallon to current federal fuel tax rates would do very little to change that. That’s because every component of the current FHWA budget has a strong constituency that will demand that any increase be spread across all current programs. Thus, the kinds of increases in current federal gasoline and diesel tax rates that are in the mainstream of discussion—even if enacted—would do virtually nothing to begin the needed \$1 trillion replacement of the first-generation Interstate system with a 21st century version.

B. Large Diesel Tax Increase Dedicated to Interstate Modernization

Perhaps recognizing the very small impact of across-the-board federal fuel tax increases, as well as the opposition of motorists to a gas tax increase, the trucking industry proposed a diesel tax surcharge whose proceeds would be placed into a newly created freight highway infrastructure fund. One example is the proposed (but not enacted) Freight Focus Act of 2010, which offered a 12¢/gallon diesel surtax, with refunds or credits for non-freight users of diesel fuel. That idea of a new trust fund sounds plausible until you look into the details of actually implementing its provisions.

On a macro level, there are flaws inherent in all four existing transportation trust funds—highway, aviation, harbor maintenance and inland waterways. Political considerations tend to drive decisions on how and where the money is spent. And in many cases, the Office of Management & Budget, at the behest of the president, limits how much money federal agencies can request each year. Often this means seeking to spend less than has been collected for the trust fund’s purposes. Prior to early 21st century reforms, that was a chronic problem with the Highway Trust Fund, and it is a *current* problem with the aviation, harbor and waterways funds.⁸

But the larger problem is how to make a diesel surcharge for freight highway improvements fair to *non-freight* diesel users—such as local service trucks (dump trucks, cement mixers, delivery trucks) and personal vehicle owners who are increasingly selecting clean-diesel cars, SUVs and pickup trucks due to better fuel economy. That subject was addressed in some detail in a study for the National Cooperative Freight Research Program (NCFRP).⁹

The NCFRP’s report (“Dedicated Revenue Mechanisms for Freight Transportation Investments”) evaluated four different versions of the dedicated diesel tax:

- Diesel tax increase with non-freight refunds
- Diesel and gasoline tax increase with non-freight refunds
- Diesel tax increase with vehicle ID
- Diesel and gasoline tax increase with vehicle ID

The vehicle ID proposals envisaged all trucks or all motor vehicles being required to have an electronic ID that would distinguish between those required to pay the new tax and those exempt. After estimating very high costs of implementation, collection and enforcement, those vehicle ID options were dropped.

Another problem analyzed in that study was *unintended consequences*. If there were to be a significant increase in the diesel tax, what fraction of the diesel freight fleet would, over time, convert to gasoline or natural gas propulsion, which might be comparatively cheaper than diesel, given the surcharge? And at the margin, what fraction of freight would shift from truck to rail, both of which could reduce the revenue generated by the new diesel tax?

The researchers compared the amount of shifting to non-diesel propulsion—or shifting freight from truck to rail—if the new diesel tax were aimed at generating modest sums such as \$5 billion per year and a higher revenue target of \$20 billion in annual revenue. The analysis of those two alternatives found that the impact of propulsion changes and mode shifts (from truck to rail) would be small if the diesel tax were intended to raise only \$5 billion per year. In that case, diversions would reduce the net revenue by \$0.5 billion a year (10%). But a much larger increase aimed at generating \$20 billion a year would lead to significant shifts away from diesel propulsion and non-trivial shifts from truck to rail. Instead of generating \$20 billion per year, the net revenue from the dedicated diesel tax was projected as being just \$10.9 billion.

But even if it were able to generate \$20B in annual revenue, a dedicated diesel tax intended to fund a \$1 trillion Interstate replacement program would have to raise more than \$20 billion a year, so those unintended consequences would be even larger (but the NCFRP report did not examine a target greater than \$20 billion per year). The analysis did estimate that if the \$20 billion target were to be generated by a dedicated tax on *both* diesel and gasoline, the unintended consequences would be far less, since there would be no motivation to shift from diesel to gasoline propulsion. The net take from a dedicated diesel and gasoline tax aimed at raising \$20 billion would be \$18.5 billion—92.5% of the target. But getting buy-in from automobile owners in addition to trucking companies would be far more difficult than getting the support of truckers only.

Hence, it is worth looking more closely at the feasibility of financing the second-generation Interstate system via all-electronic tolling.

C. Per-Mile Tolling of the Entire Second-Generation Interstate System

The basic findings of the Interstate 2.0 study were summarized in the previous section. In contrast to a dedicated diesel tax, with all its complexities, the tolling alternative would have all Interstate users—cars as well as trucks—pay modest tolls, electronically, to cover the capital and operating costs of the new system. By spreading the costs over *all Interstate users*, the burden on the trucking industry would be considerably lower than with a new federal trust fund based on a diesel surtax. In addition, because the reconstruction and

modernization would be financed up front by issuing toll revenue bonds, reconstruction and lane-addition efforts could be completed years or decades sooner than under the 20th century model that funds annual construction budgets out of annual fuel tax revenues. The proposal assumed a *state-led* effort, which states could opt into, with federal permission, under federal rules limiting the toll revenues to the reconstructed and widened Interstates. One consequence would be that the toll revenues generated in a state would remain in that state, for use only on that state's Interstates.

To expand on the previous summary, the Interstate 2.0 state-by-state toll feasibility results varied, with the majority of states able to finance the reconstruction and widening of their *long-distance Interstates* with tolls less than or equal to the baseline starting rates of 3.5¢/mile cars and 14.0¢/mile trucks. Specifically, 36 of the 50 states fell into this category, and some of them (with mostly flat terrain and low construction costs) could do it for as little as 1.9¢/mi. cars and 7.6¢/mi. trucks (Arkansas and Louisiana). Ten states with somewhat lower traffic levels and hilly terrain would need car toll rates of 4.1 to 5.8¢/mile, and truck tolls of 16.4 to 23.2¢/mile. Those rates are still in the ballpark of current national average toll rates for rural Interstates and other toll roads (4.9¢/mi. cars and 19.9¢/mi. trucks).

Because the reconstruction and modernization would be financed up front by issuing toll revenue bonds, reconstruction and lane-addition efforts could be completed years or decades sooner.

Overall, only three states ended up looking non-toll-feasible based on the Interstate 2.0 modeling, all with low traffic and mountainous terrain: Alaska, Montana and Vermont. None of them are major truck-route states, none needed lane additions, and it's not clear that their Interstates have worn out to the same extent as those of higher-traffic states.

The toll feasibility calculation results showed that nationwide net present value of *urban Interstate* revenues equaled 93% of the NPV of costs, but with larger state-by-state variation than for rural Interstates. Of the 50 states plus D.C., 38 could cover 90% or more of the costs via the proposed toll rate schedules, and most of the others could do so at somewhat higher rates.

Urban Interstates are far more costly to rebuild and add lanes to, and also have most of the nation's serious congestion. The analysis of urban Interstate reconstruction and lane additions, of necessity, required higher-than-baseline toll rates to generate enough revenue, and rates higher at peak times than at off-peak times. Since congestion and construction costs are both higher in larger urban areas, a different rate schedule was applied for urban

areas defined as small, medium, large and very large. Off-peak rates in small urban areas were the baseline 3.5¢/mi. cars and 14¢/mi. trucks, with peak rates somewhat higher. A similar pattern was followed for the other three size categories.

Part 4

Other Aspects of 21st Century Tolling

A. Trucking Industry Bypass Systems

The trucking industry has been in the forefront of using technology to enable long-distance trucks to bypass weigh stations and inspection stations. In 1983 the industry created a nonprofit organization called HELP, Inc. (Heavy-Vehicle Electronic License Plate) to develop an electronic system to enable registered trucks to bypass weigh stations by using weigh-in-motion technology and automatic vehicle identification (AVI) in the form of a truck-mounted transponder with a unique encoded ID number. Initial implementation began in 1991, with six western states and one Canadian province, whose territory formed a crescent (hence the name Crescent Project).

The system today is called PrePass, and is operational in 32 states. As of March 2015 it has over 69,000 carrier accounts and over 504,000 enrolled trucks. In addition to offering bypass of weigh stations, PrePass also allows transponder-equipped trucks to bypass agricultural inspection stations and port-of-entry facilities. The savings in time and fuel result in significant reductions in operating cost and vehicle emissions. In 2012, there were nearly 51 million successful electronic screening bypasses, saving 4.2 million man-hours and nearly 20.3 million gallons of fuel. HELP estimates that added up to \$441 million in operating cost savings for participating carriers.¹⁰ And the reduced fuel use resulted in an estimated CO₂ reduction of 44.9 million metric tons.

Instead of the regular transponder, participating carriers are provided with a fusion transponder that works at every toll facility in the 15 states that participate in the E-ZPass system of interoperable electronic tolling.

Since the only on-board equipment needed for PrePass is a windshield-mounted transponder of the kind now ubiquitous for electronic toll collection, in 2002 HELP, Inc. launched PrePass Plus to enable trucks using toll roads in the Northeast and Midwest to also use their transponder for *toll plaza bypass*. Instead of the regular transponder,

participating carriers are provided with a fusion transponder that works at every toll facility in the 15 states that participate in the E-ZPass system of interoperable electronic tolling. The E-ZPass network extends from Maine on the east to Illinois on the west, and as far south as North Carolina. Florida and Georgia are close to making their electronic toll systems compatible with E-ZPass, as well.

Carriers participating in PrePass Plus avoid the need for multiple transponders for toll collection, but the benefits don't stop there. PrePass Plus also provides them with a *single, consolidated bill* each month, itemizing the toll transactions for each trip by each of its trucks. This service is provided by the PrePass Service Center, currently operated for HELP, Inc. by a division of Xerox.

In recent years two other services have come to market, offering trucking companies electronic tolling and bypass services. Bestpass began in 2003 as a subsidiary of the New York State Motor Truck Association, with initial operations in New York and Maryland. In 2011, as it expanded to other states, it began offering a single monthly invoice to subscribers, and in 2012 it introduced a fusion transponder compatible with all E-ZPass and weigh station bypass services provided by PrePass, NCPass (in North Carolina), and NORPASS (a nonprofit offering weigh station bypass for trucking in northern states and several Canadian provinces). Bestpass added electronic toll collection services in North Carolina and Colorado in 2013. It added the three U.S.-Canada toll bridges of the Niagara Falls Bridge Commission in 2014 and the seven toll bridges in the San Francisco area operated by the Bay Area Toll Authority in 2015. And in March 2015 Bestpass announced the availability of a multi-protocol transponder called Horizon, compatible with all non-E-ZPass electronic tolling systems. Both PrePass and Bestpass are ATA Featured Products.

Drivewyze, founded in 2012, offers an alternative to the transponder as a means for trucks to participate in PrePass weigh station bypass. It uses an app that truckers can download to either a tablet or a smartphone. As of March 2015, Drivewyze PreClear is available at 478 weigh station locations in 33 states.

PrePass Plus produces a *single, consolidated bill* each month, itemizing the toll transactions for each trip by each of its trucks.

B. National Electronic Tolling Interoperability

In the 2012 reauthorization of the federal highway and transit program, MAP-21, one provision of Section 1512 provides that “Not later than 4 years after the date of enactment of this Act, all toll facilities on the Federal-aid highways shall implement technologies or

business practices that provide for the interoperability of electronic toll collection programs.” There are a number of ways to provide such interoperability, including:

- Video tolling, based on imaging the vehicle license plate;
- A national tolling protocol with a single nationwide transponder (requires upgrading all tolling locations);
- A multiprotocol transponder that operates with all existing toll system protocols (requires new transponders for all users);
- Smartphone tolling (in which the smartphone uses the relevant protocol as it approaches a tolling point); and,
- A new overall system using dedicated short range communications (DSRC) in the 5.9 GHz band.

A good overview of the pros and cons of these alternatives appeared recently in *Thinking Highways*.¹¹

The tolling industry, represented by the International Bridge, Tunnel & Turnpike Association (IBTTA), a standard-setting body called OmniAir, and various tolling technology companies, is assessing the alternatives for complying with this mandate. IBTTA’s Interoperability Committee and the Alliance for Toll Interoperability created and operated a Hub Pilot Program to prove the concept of a national exchange of transaction information for license plate tolling; the same concept can be applied to transponder tolling.

IBTTA has defined the goal of nationwide electronic tolling interoperability as “a system in which customers have the choice of opting in and are able to pay tolls on any participating toll system in the country using a single account. The immediate goal is to achieve nationwide interoperability for valid pre-paid toll customers—in essence, registered toll customers.”¹²[emphasis in original] That is broadly consistent with the PrePass Plus and Bestpass systems, in which all users are registered and known in advance to the tolling operators and to clearinghouses such as those of PrePass and Bestpass, and whose sole means of tolling is transponders.

There is no inherent reason that the system(s) adopted for cars need be the same system adopted for commercial trucking.

Most of the interoperability discussion is focused on personal vehicles, as opposed to truck fleets. Given that a number of options for implementing national interoperability are being

contemplated, there is no inherent reason that the system(s) adopted for cars need be the same system adopted for commercial trucking. In 2014 Xerox proposed a truck-only system, which would be an expansion of PrePass Plus. As noted above, the current PrePass Plus offers tolling services only in the 15 E-ZPass states, whereas Bestpass has begun to expand to other states. The Xerox proposal called for PrePass Plus members to upgrade to a multi-protocol transponder that would be compatible with all four of the major regional tolling protocols in operation today. That approach would avoid the need for all the country's toll facility operators to agree on replacing their tolling-point equipment with multi-protocol *readers*—a major expense, and an approach that could well take 10 to 15 years.

Under the PrePass Plus expansion, companies operating outside the E-ZPass region would replace their transponders with an existing multi-protocol transponder, such as Transcore's new GoAnywherePass. If this approach were implemented, participating carriers would continue to receive a *single, consolidated monthly invoice* from the PrePass Service Center in Utah, just as they do today. HELP, Inc. and Xerox would pay the amount due to the toll agencies whose services the truck used, and they would be responsible for collecting the charges from the trucking company. The White Paper in which this proposal was presented also proposed that HELP, Inc. could purchase the new transponders in bulk and rent them to participating trucking companies, charging a nominal monthly service fee; that would avoid the trucking company incurring a capital expenditure to replace its existing PrePass Plus transponders.¹³

While the proposed PrePass Plus expansion has not been launched as of this writing, it is an example of how the trucking-services industry is gearing up for nationwide electronic tolling interoperability.

When legacy toll agencies reach the AET stage, they may still retain business methods developed in the cash tolling days, so their cost of toll collection may not fully reflect what AET makes possible.

C. Cost of All-Electronic Toll Collection

The general perception, both within the trucking industry and among the public at large, is that the cost of collecting tolls consumes a considerable fraction of the revenue collected, often put at 20 to 30%. Numbers such as this have appeared in studies analyzing the budgets of legacy toll agencies, but those costs reflect labor-intensive toll booths and toll plazas, the need for safeguarding large amounts of cash, and complicated business rules that have grown over time.

Traditional tolling has been disrupted in recent years by three successive waves of new technology:

1. *Electronic toll collection (ETC)* that enables users to go through toll lanes without stopping, via use of a windshield-mounted transponder.
2. *Open road tolling (ORT)* that allows transponder users to pay their tolls in normal traffic lanes at highway speed, with cash tolling offered at a smaller number of cash toll lanes off to the side.
3. *All-electronic tolling (AET)* that eliminates cash tolls and toll plazas altogether, via a choice of transponder use or license-plate tolling.

Toll agencies are at various stages of transition through these steps, with only a small fraction thus far at stage 3 (including the southern portion of Florida's Turnpike, the toll roads of NTTA in Dallas and of CTRMA in Austin, and E-470 in Denver). When legacy toll agencies reach the AET stage, they may still retain business methods developed in the cash tolling days, so their cost of toll collection may not fully reflect what AET makes possible.

If currently non-tolled Interstates were rebuilt and widened based on toll financing, whoever provided the tolling on these replacement Interstates could design the business model from scratch, to take full advantage of AET's inherent efficiencies.

If currently non-tolled Interstates were rebuilt and widened based on toll financing, whoever provided the tolling on these replacement Interstates could design the business model from scratch, to take full advantage of AET's inherent efficiencies. The lowest-cost way to operate an AET-based tolling system is via the use of pre-paid accounts and transponders. Pre-paid accounts significantly reduce the costs of collection, and using transponders to identify the vehicle is the least-costly way to collect a toll (compared with video imaging of license plates).

A team of electronic tolling experts commissioned by Reason Foundation in 2012 identified three toll agencies that had created all-AET systems from scratch, with business rules aimed at approaching the ideal of all-transponder vehicle identification and all-prepaid accounts.¹⁴ The three non-legacy providers were Colorado DOT's I-25 Managed Lanes (CDOT), Fort Bend County (TX) Toll Road Authority (FBCTRA), and the Tampa Hillsborough Expressway Authority (THEA). For their transponder tolling, the cost of collection as a percentage of revenue was 3.9%, 6.25%, and 9.1%, respectively. Due to

differences in their percentages of license plate tolling and billing, their *overall* cost of collection ranged from a low of 10.1% to a high of 28.7% (for the very small I-25 HOT lanes). Those calculations are based on the relatively low toll charges from these suburban toll roads whose customers are almost all personal vehicles. If those cost ratios are recomputed based on an average toll of \$5 (a more likely rate for a truck), their cost of collection as a percentage of revenues would range between 4.4% and 13.1%.

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There are economies of scale in tolling, and the number of transactions processed by the above three agencies is relatively small, especially the CDOT I-25 HOT lanes. All three have been able to economize by contracting with larger providers for various services (e.g., CDOT outsources toll collection to nearby E-470), so their costs could be even lower were they operating at a much larger scale. The fact that their cost of collection with transponder/prepaid accounts is between 4 and 9% of revenue (even at their relatively low car toll rates) demonstrates the very large collection-cost difference between legacy cash toll collection and 21st century AET collection.

The low cost of transponder-only tolling is evident in the existing PrePass Plus system. Participating trucking companies pay \$10 per truck per month for basic (non-toll) PrePass service; adding the tolling service costs an additional \$5 per truck per month. That \$5 per month pays for consolidated billing and collection by PrePass Plus. If a truck incurred toll charges of \$200 during a month, the billing and collection cost would be 2.5% of revenue; if it had tolls of \$300, the collection cost would be only 1.67% of revenue. Thus, trucks operating within the 15 E-ZPass states today are already participating in a system with the very low billing and collection costs of transponder-only tolling of trucks.

The toll agencies save considerable money serving trucks under such arrangements, because of the following:

- The toll agency does not have to provide or issue the transponders;
- The toll agency does not have to bill the trucking companies;
- The toll agency has little or no customer service costs with participating trucking companies;
- The toll agency has no cash-flow or bad-debt problem with these accounts, because the trucking service provider (PrePass Plus or Bestpass) pays the tolls and then collects from the trucking companies.

These savings reduce the toll agency's overall cost of toll collection, meaning that a larger share of its revenue is available for the capital and operating costs of the highways themselves.

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A numerical example may further illustrate the point. Assume a toll road whose traffic consists of 90% cars and 10% trucks—360,000 cars and 40,000 trucks per month. Tolling is all-electronic, with a per-mile rate for trucks three times that for cars. Assume the average car makes 10 one-way trips/month at \$5 each, and the average truck makes 50 trips/month, each three times longer on average than car trips, so at \$15 times 3 paying \$45 for each trip. Monthly toll revenue is therefore \$18 million from cars and \$90 million from trucks, totaling \$108 million. If the cost of collection, billing, etc. is 10% for cars and 3% for trucks (assuming a Bestpass type billing system), the total collection cost is \$1.8 million for cars and \$2.7 million for trucks: \$4.5 million total. That is just 4.2% of the \$110 million toll revenue.

From the trucking industry's standpoint, whether the toll agency's overall cost of toll collection is 5% or 10% should be less relevant than the very low cost of toll collection to the trucking industry itself. As noted above, with service providers like Bestpass and PrePass Plus in the picture, a trucking company's cost of billing and collection—for a single nationwide monthly bill—is only a few percent of the amount of toll paid. That is dramatically different from the situation with 20th century cash tolling.

Part 5

Industry Concerns that Need Addressing

A number of issues unique to the trucking industry must be addressed in assessing the practical feasibility of a toll-financed 21st century Interstate system. These concerns are discussed in this section.

A. Confidentiality of Routing and Billing Information

Trucking companies compete fiercely, and therefore safeguard detailed information about which customers they serve, what routes they take, how reliable their schedules are, etc. Important information about such business operations could be deduced from detailed toll invoices, especially in a future system where a much larger fraction of the Interstate system was tolled. Hence, strict confidentiality must be built into the creation and distribution of toll invoices generated by the regional or nationally interoperable tolling service provider.

The prototypes for a *national* all-electronic truck tolling system are the current Bestpass and PrePass Plus systems. Those systems have been in operation since 2002–03 and have met the trucking industry’s need for confidentiality of tolling and routing information. One or both of these service providers will likely expand nationwide as tolling expands to more states.

Strict confidentiality must be built into the creation and distribution of toll invoices generated by the tolling service provider.

B. Pass-Through of Toll Charges to Shippers

An ongoing trucking industry concern with using toll roads is the difficulty of getting their customers to accept toll charges as part of the company’s operating costs. This problem stems in part from the 20th century practice of cash tolling, when it was difficult or impractical to maintain credible paper records documenting the tolls that drivers paid on

particular trips. All-electronic tolling, as would exist on toll-financed reconstructed and modernized Interstates, would provide a trucking company with a detailed monthly electronic invoice for all the tolls incurred by its trucks, identified by route, date, and time. The trucking company would need to develop software to assign specific toll charges to individual customers, with the electronic tolling record as documentation.

If and when a toll-financed second-generation Interstate system gets under way, the ongoing increase in truck tolling will make tolling more of a standard element of truck operating costs, as fuel taxes begin to be phased out on the toll-financed replacement corridors. That should encourage shippers to accept well-documented toll charges as basic components of truck shipping costs.

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C. Predictable Toll Rates

The trucking industry has expressed serious concerns about the possible use of variable toll rates on urban freeways—as exist today on an increasing number of express toll lanes. Tolls on these lanes vary either via a fixed time-of-day schedule or in near-real-time, since that type of tolling is aimed at limiting the number of vehicles per lane per hour to a number compatible with high-volume but uncongested service (typically Level of Service C or better). Nearly all such express toll lanes are open only to light vehicles and buses, so trucks have not been affected. Nevertheless, since such pricing has been amply demonstrated to be effective in providing uncongested flow even during the busiest times of day, it is conceivable that some form of variable or peak/off-peak tolls could in the future be implemented on urban Interstates and other expressways. In that scenario, an 18-wheeler entering Los Angeles at 8 AM with no idea what its toll would be is unacceptable to the trucking industry.

Therefore, to the extent that future toll-financed urban Interstates might involve some form of variable tolling, it would be important to charge trucks based on a *pre-set time-of-day toll schedule*, rather than the dynamic tolling increasingly used for cars and other light vehicles on express toll lanes. That way, the company or driver would be able to decide well in advance what route to take at what time of day, knowing in advance what the toll charges would be. This kind of time-of-day tolling schedule has existed on the 91 Express Lanes in Orange County, California since they first opened to traffic in December 1995. Since traffic demand in that corridor varies significantly by day of the week as well as by

hour of the day, the toll schedule provides the toll rate in effect for each one-hour period of each day of the week. It is readily available online.¹⁵ The toll rate schedule is adjusted once every six months, based on measured traffic density, so as to ensure continued LOS C traffic flow.¹⁶ If a similar policy applied to an urban Interstate's general purpose lanes or dedicated truck lanes, a trucking company would know in advance the toll rates in effect for an entire six-month period. As noted, this kind of tolling policy would very likely apply only on generally congested urban Interstates, not on long-distance rural Interstates.

D. Different Rates on Every Highway

A related trucking industry concern is being faced with different toll rates every time a truck crosses a state border. That situation already exists in the 15 Northeast and Midwest states where many Interstates are tolled, but where electronic tolling interoperability is well-established under the E-ZPass system. All the toll rates charged in those states are known in advance, and are changed only occasionally (typically only once every few years). A truck trip on I-90 from Boston to Rockford, IL involves toll charges in Massachusetts, New York, Ohio, Indiana and Illinois. But a company planning this trip knows in advance what the toll charges will be, and if it is signed up for PrePass Plus or Bestpass it will get a single monthly invoice that includes the entire I-90 trip.

Historically, the trucking industry has coped with different diesel tax rates in the 50 states, via the International Fuel Tax Agreement. With nationwide truck tolling interoperability and service providers like PrePass Plus and Bestpass, the problem should be easily manageable, so a trucking company would know all the toll rates in advance.

It would be important to charge trucks based on a *pre-set time-of-day toll schedule*, rather than the dynamic tolling increasingly used for cars and other light vehicles on express toll lanes.

E. Getting Off the Tolled Interstate for Services

The National Association of Truck Stop Owners (NATSO) has raised a concern that users of a tolled Interstate would be reluctant to get off to purchase services such as fuel and food because they would pay more tolls by getting off and then getting back on. That would mean less business for the truck stops and fast-food outlets represented by NATSO.

This appears to be another concern from the era of cash tolling that is no longer relevant in an era based on 21st century tolling. Most legacy toll roads use barrier tolling, under which

a vehicle pays only occasionally when it encounters a toll plaza constructed as a barrier across the entire highway. To avoid “shun-piking,” where a vehicle exits shortly before the barrier toll plaza and re-enters shortly after the barrier, many legacy toll roads charge entry and/or exit tolls at such locations. By contrast, the fairest and most likely way to charge 21st century tolls is on a per-mile basis. There would be no barrier tolling. Instead, every on-ramp and off-ramp would be equipped to identify the vehicle’s transponder as it entered, and again when it left, applying the per-mile toll rate to the number of miles in between. Hence, between a trip’s origin and its destination (e.g., the aforementioned Boston to Rockford), the total toll charge would be the same, regardless of how many times the vehicle got off the tolled Interstate and got back on. It would pay only for the total miles driven on the Interstate.

F. Cost Compared with Current Taxes

One important principle emerging in research on mileage-based user fees (MBUFs) is the idea that the MBUF would *replace*, rather than be charged in addition to, current per-gallon fuel taxes. (This feature is built into MBUF pilot programs in California, Minnesota and Oregon.) An all-electronic tolling system would make it feasible, in principle, to provide rebates of fuel taxes paid for the fuel used on a toll-financed, reconstructed Interstate. Since all trucks would be pre-registered with the toll system provider (e.g., PrePass Plus or Bestpass), its vehicle class and year of manufacture would be known. That provides an approximate fuel economy rating, on the basis of which fuel consumed for the miles driven on the tolled Interstate would be estimated. The state’s diesel tax rate would then be applied so as to calculate the amount of fuel-tax rebate owed to the trucking company. (For multi-state trips, allocation among states would be handled via the existing International Fuel Tax Agreement, to which all trucking companies belong.)

In addition to the diesel tax, many states collect several other taxes from trucking firms. In New York State in 2009, according to a recent study, that state charged a diesel tax yielding \$336 million, truck registration fees totaling \$151 million, and a ton-mile tax totaling \$282 million, for a grand total of \$769 million.¹⁷ The study in question was an exploration of a possible truck per-mile fee that would *replace all three existing state truck taxes*. Three New York-based motor carriers took part in the study, providing data and advice. According to the report’s executive summary:

The participating commercial vehicle operators stated that their goals [for participating] included a desire to simplify the current tax system that is a concatenation of registrations, fuel taxes, mileage fees, tolls, and Interstate fees. The commercial carriers expressed support for consolidating the tax structure down to a single mileage based system similar to the IFTA system in which interstate truckers are required to participate.

Among the findings of the study was that a simple charge of 10.6¢/mile for non-Thruway miles and a Thruway charge of 5.1¢/mile plus tolls would generate the same revenue as the current set of state truck taxes.

Let's consider the user-tax/user-fee cost of four different situations: today's aging non-tolled Interstate, a current tolled Interstate, a replacement Interstate with state fuel tax rebate, and a replacement Interstate with eventual federal and state fuel tax rebates. The current average state diesel tax is 25.84¢/gal. and the federal diesel tax is 24.4¢/gal. At a heavy truck fuel consumption rate of 7 mpg, the tax cost per mile is 7.2¢/mi. for the total diesel tax, or 3.5¢/mi. for just the federal diesel tax. The average truck toll on current long-distance tolled Interstates is 19.9¢/mi., while the baseline toll for Interstate 2.0 is 14¢/mi.

For the four different situations, here is the per-mile charge to use the highway:

- Current non-tolled Interstate: diesel tax only = 7.2¢/mile
- Current tolled Interstate: diesel tax (7.2¢) + toll (19.9¢) = 27.1¢/mile
- Interstate 2.0/state rebate: diesel tax (3.5¢) + toll (14¢) = 17.5¢/mile
- Interstate 2.0/full rebate: no diesel tax + toll (14¢) = 14.0¢/mile

The current non-tolled Interstate is obviously the least costly, but the Interstates *cannot and will not be reconstructed at that low rate*. If a full (federal plus state) rebate of diesel taxes were available for all miles driven on the replacement Interstate 2.0 facilities, the cost per mile would be almost double the current fuel tax rate. But that would be dramatically less than the *current per-mile cost* to use tolled Interstates (14¢/mile instead of 27.1¢/mile).

Part 6

Guaranteeing that 21st Century Tolls Are True User Fees

Given the history of many legislatures and legacy toll agencies having treated toll roads as cash cows, it's understandable that the trucking industry would cast a skeptical eye on the proposed toll-financed reconstruction of the Interstate highway system. If a replacement system can, in fact, be built and maintained for a baseline heavy truck rate of 14¢/mi. (CPI-adjusted), then the current 27.1¢/mile toll plus tax to use legacy tolled Interstates is a very poor value for the money. The key differences between the Interstate 2.0 model and legacy tolled Interstates are (1) the toll rates in the former being limited to the capital and operating costs of the 21st century facilities, and (2) the CPI adjustments to retain the real value of the toll revenue over time.

What would it take to guarantee that a program to replace aging Interstates with second-generation highways, with low-cost all-electronic tolling and dedicated truck lanes, would provide real value for trucking companies (and other highway users)? A set of enforceable policies would be needed to eliminate double taxation (tolls plus fuel taxes on the same replacement highway) and ensure that the toll rates covered only the legitimate capital and operating costs of the toll-financed replacement highways.

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A 2014 Reason Foundation study proposed a set of policies aimed at doing that, called “value-added tolling.”¹⁸ It proposed five policy provisions, as follows:

1. Limit the use of toll revenues to the tolled facilities (which could include all of a state's rural Interstates as a system, and all of its urban Interstates as a separate system).

2. Charge only enough to cover the full capital and operating costs of the tolled facilities (including a reasonable return on investment for investors, if done as a toll concession).
3. Begin tolling only after the facility's construction or reconstruction has been completed and it is open for use.
4. Use tolls instead of, not in addition to, current highway user taxes.
5. Provide a higher level of service than current state DOT practice (e.g. in terms of less congestion and better ongoing pavement quality).

These five policies, if actually put into practice, would provide a genuine value proposition for highway users, truckers and motorists alike. But how would they be put into practice?

Both federal and state governments would need to be involved in protecting highway users' interest in this regard. At the federal level, it is currently not legal to put tolls on existing, non-tolled Interstates (except for three facilities that Congress has allowed to be reconstructed using toll finance in a pilot program). If Congress were to allow states to replace existing Interstates with a 21st century version, using toll finance, it could impose the above policies 1 through 4 as required conditions. In addition to these being federal law, any state opting to proceed would be required to pass state enabling legislation that reiterated the state's commitment to enforcing those provisions.

In the near term, it is highly unlikely that Congress would agree to provide rebates on the *federal* diesel tax for users of these replacement Interstates, given the serious shortfalls in federal highway user-tax revenues. But states would come out significantly ahead if they no longer had to cover the costs of Interstate reconstruction, widening, and maintenance out of their current highway budgets, even after giving state fuel tax rebates to users of the replacement facilities. Longer term, as Congress gets more serious about shifting from per-gallon taxes to per-mile charges, it may come to see federal fuel-tax rebates as an added inducement for states to proceed with toll-financed Interstate replacement. Since the Interstates handle 25% of all vehicle-miles of travel, shifting them over from per-gallon to per-mile funding would be a major step in an overall effort to replace fuel taxes with mileage-based user fees.

The fifth policy—a required higher level of service—though desirable, may be seen as overkill for the federal government to impose, and may be better left as an option for states to consider including in their own enabling legislation.

Part 7

Conclusions and Recommendations

This study began by presenting a vision of a second-generation Interstate highway system, replacing the first-generation system that is nearing the end of its useful life. The replacement system would be self-funded by pure user fees that would also ensure that the system was properly maintained. In corridors that are major truck routes, dedicated truck-only lanes would be added, as in the proposed I-70 Corridors of the Future project.

The key to making this vision a reality is for highway users, including the trucking industry, to embrace all-electronic 21st century tolling as the best available way to finance this trillion-dollar make-over of America's most important highway system. The trucking industry in most of the eastern United States is already making use of a 15-state fully interoperable electronic tolling system (PrePass Plus), under which each operator receives a single monthly invoice for all tolled trips in any of the 15 states. Nationwide truck electronic tolling interoperability is on the near-term horizon, with Bestpass and PrePass Plus-type service becoming available nationwide, at a collection cost below 5% of the revenue collected.

Trucking industry concerns about confidentiality of routing and billing information are already being addressed via Bestpass and PrePass Plus. Single-source electronic toll invoicing, as provided by Bestpass and PrePass Plus, should encourage shippers and receivers to accept toll costs as a reimbursable portion of truck shipping costs. In addition, there is growing support for the idea of providing rebates of fuel taxes paid on highways where per-mile fees are instituted.

Highway user safeguards in the program should (a) limit toll revenues to what is needed to cover only the capital and operating costs of the replacement Interstates, (b) prohibit collecting tolls until a corridor has been rebuilt, and (c) require state fuel-tax rebates for miles driven on the rebuilt, tolled Interstates.

Congressional debate is under way on reauthorizing the expired MAP-21 surface transportation legislation. One proposal being considered is to expand and modify the current three-state pilot program under which three states can each opt to reconstruct one existing Interstate using toll finance. Although Missouri, North Carolina and Virginia currently hold the three slots, none has yet generated the political consensus to reconstruct its chosen project (which is a reconstructed I-70 with dedicated truck lanes in Missouri).

The current pilot program is too small and lacks a use-it-or-lose-it provision. Since it is politically difficult for a state to generate a consensus in favor of this large a change, the odds of a pioneer state actually doing this would be increased if more states had the opportunity to try. So the program could be expanded to more states, and a use-it-or-lose-it provision added.

Also, by allowing a state to rebuild only one Interstate with toll finance, the program creates geographic equity problems within a pilot state. In North Carolina, residents near the designated I-95 complained that they would be singled out to pay tolls, compared with those living near I-40, I-77, or I-85. If the pilot allowed a state to reconstruct all its Interstates, a responsible state DOT could develop a 20-year plan to reconstruct and modernize all its Interstates using toll finance, in priority order.

The current pilot program *also* lacks sufficient safeguards for highway users. It does not limit toll rates solely to the amounts needed to cover the capital and operating costs of the reconstructed Interstates. Instead, it allows for “surplus revenues” to be collected and used for other transportation projects in the state. Highway user safeguards in the program should (a) limit toll revenues to what is needed to cover only the capital and operating costs of the replacement Interstates, (b) prohibit collecting tolls until a corridor has been rebuilt, and (c) require state fuel-tax rebates for miles driven on the rebuilt, tolled Interstates.

Supporting such changes would be a departure from recent trucking industry practice. But as this report has sought to demonstrate, the Interstate system urgently needs major reconstruction and widening—and there is no other trillion-dollar funding source in sight. With full use of 21st century all-electronic tolling, plus strong federal highway user protections, toll-financed Interstate modernization offers an attractive value proposition for trucking and other highway users.

About the Author

Robert Poole is director of transportation policy and the Searle Freedom Trust Transportation Fellow at Reason Foundation. He received his B.S. and M.S. in mechanical engineering at MIT and did graduate work in operations research at NYU.

His 1988 policy paper proposing privately financed, congestion-relief toll lanes inspired California's private tollway pilot projects law (AB 680), which has served as the prototype for more than two dozen similar laws in other states. In 1993 he directed a study that introduced the term HOT Lanes. In 2001 he co-authored a Reason study introducing the case for dedicated truck-only lanes.

Poole has been an advisor to the Federal Highway Administration, the Federal Transit Administration, the White House Office of Policy Development, and the DOTs of California, Florida, Georgia, Indiana, Utah, Virginia, Texas, and Washington State. He served on the Caltrans Privatization Advisory Steering Committee, in 1989-90, and was a member of California's Commission on Transportation Investment in 1995-96.

He is a member of the board of the Public-Private Partnerships division of ARTBA and a member of the Transportation Research Board's Managed Lanes Committee. In 2003-05 he was a member of the TRB's special committee on the long-term viability of fuel taxes for transportation funding. In 2008 he served as a member of the Texas Study Committee on Private Participation in Toll Roads. In 2010 he served as a member of the Expert Review Panel on Managed Lanes, for the Washington State DOT. He also served on the transition team for Florida's Gov.-Elect Rick Scott.

He writes a monthly column on transportation policy issues for *Public Works Financing*, and publishes the monthly Reason e-newsletter, *Surface Transportation Innovations*.

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