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# Roads and Highways

(Harrison Shull)

Aerial image of the cloverleaf interchange where highway 64 meets I-26 at Hendersonville, North Carolina.

# Congressional Road Rage: How to Pay for America's Highways and Roads

By Paul McCaffrey

The backbone of the American transportation infrastructure is the Interstate Highway System. Measuring almost 50,000 miles in length, the vast network was named one of the Seven Wonders of the United States by the American Society of Civil Engineers. Though it composes slightly more than 1 percent of the nation's total public road surface, the Interstate system carries almost 25 percent of the country's passenger transport and nearly 50 percent of its motorized freight. America's highways serve as one of its main movers of people and commerce. Among the major arteries of the system are I-90, which runs from Boston to Seattle, and I-95, which extends from Maine to Miami.

Initially known as the National Defense Highway System (NDHS), the Interstate Highway System developed as part of the Federal Highway Act, which President Dwight David Eisenhower signed into law on June 29, 1956. The legislation stands as one of Eisenhower's signature achievements as president, and one he was uniquely qualified to champion and implement.

In 1919, then-Lieutenant Colonel Eisenhower took part in the First Transcontinental Motor Convoy (FTMC). Leaving from Washington, DC, the motorcade of military vehicles crossed the nation, traveling all the way to San Francisco. The purpose of the mission was informed by the armed forces' experience in World War I. Mechanization had changed the logistics of military transport. In the course of the conflict, motorized vehicles eclipsed railroads and horses as the principal means for moving men and materiel to and from the front. However, roads and bridges that could accommodate foot soldiers, horses, and even conventional automobiles could not hold up under the weight of tanks, trucks, and armored cars. In response, the American military sought to understand what infrastructure difficulties might be involved in transporting an army across a large landmass.

The convoy's roughly 3,250-mile journey took over two months to complete. The motorcade covered approximately 58 miles per day at a speed of roughly 6 miles per hour. The problems encountered along the way are almost too numerous to list. The fleet of vehicles overwhelmed the existing roadways and mostly wooden bridges along the way, and by the end of the trip, the convoy had heavily damaged or destroyed eighty-eight bridges and culverts. In many places, roads were just too narrow to accommodate the convoy's vehicles. Other bridges and stretches of roadway had been admirably designed and built, but had fallen apart due to disrepair. The Lincoln Highway, the nation's principle transcontinental motorway, was criticized as being little more than an "imaginary line."

Nine vehicles were lost in the 230 road accidents experienced along the route: some were swallowed up by quicksand or mud; others were compromised by traffic mishaps. But the toll of the journey was not limited to infrastructure and vehicles. Of the nearly 300 personnel who participated in the trek, twenty-one were listed as casualties before it was over, suffering injury or illness during the course of the mission. The underlying lesson was not lost on the military. The state of American roadways left much to be desired, and constituted a potential national security threat.

Eisenhower's experience in World War II further convinced him of the military importance of sound roadways. In the early stages of American participation in the Allied effort, Eisenhower commanded forces in the North African theatre, where long supply lines, difficult terrain, and an absence of functional roads made for nightmarish logistics.

As military leader during the Allied invasion of France, Eisenhower faced other transport challenges. Once the Nazi's Atlantic Wall protecting the Normandy coast had been breached in the D-Day assault, Allied forces advanced at a snail's pace, hampered by poor roads and Normandy's difficult topography.

When Eisenhower's army entered Germany, however, it gained access to Hitler's autobahn, a system of broad, well-maintained highways that facilitated the movement of military supplies and personnel. Referring to his experiences in later years, Eisenhower commented, "The old [FTMC] convoy had started me thinking about good, two-lane highways, but Germany had made me see the wisdom of broader ribbons across the land."

By the time Eisenhower became president in 1953, the issue of road transportation in the US had taken on increasing importance. The Cold War with the Soviet Union, and the threat of nuclear conflict, reemphasized the necessity of an efficient transportation system as part of a comprehensive national defense strategy. During the early years of his administration, Eisenhower staked much of his political capital on developing such a network. He was not the first to try. A national highway bill had been passed by Congress in the 1940s with the idea of building 40,000 miles of interstate roadways, but the programs that resulted never received the necessary funding, and the system languished. Eisenhower used all his powers of persuasion to see that his highway initiative would not suffer the same fate.

While motivated in part by military necessity, Eisenhower stressed the system's other benefits in promoting the measure. "Our unity as a nation is sustained by free communication of thought and by easy transportation of people and goods," he declared. "The ceaseless flow of information throughout the Republic is matched by individual and commercial movement over a vast system of interconnected highways crisscrossing the country and joining at our national borders with friendly neighbors to the north and south."

In 1956, The Federal-Aid Highway Act was approved by Congress, and Eisenhower signed it into law. Funding for the NHDS came from gas and highway user taxes and was dispersed according to a pay-as-you go formula. A Highway Trust Fund was established to pool the project's resources. Initial estimates pegged the total cost of Interstate construction at around $23 to $27 billion, and estimated that

the system could be built within twelve years. States submitted proposed construction initiatives to the federal government. Once these plans were approved, the states would pay to build them and then be reimbursed with money from the Highway Trust Fund. Bond issues would be used on occasion to finance certain projects. Given the importance of the system to national security, the federal government took responsibility for the bulk of the funding, paying roughly 90 percent of the costs. The states covered the remaining 10 percent. According to a 1991 estimate, the final bill for the Interstate System (completed in 1992) was $128.9 billion, with the federal government supplying $114.3 billion of that money.

While the Interstate Highway System took much longer to build than initial estimates, and cost five times more to construct than first planned, it has been widely regarded as a transformative success. It is credited with helping to create the country's economic prosperity of the late twentieth and early twenty-first century. "More than any single action by the government since the end of the war, this one would change the face of America," Eisenhower presciently remarked in 1963. "Its impact on the American economy—the jobs it would produce in manufacturing and construction, the rural areas it would open up—was beyond calculation." In recognition of Eisenhower's integral role in its creation, the National System of Interstate and Defense Highways was renamed the Dwight D. Eisenhower System of Interstate and Defense Highways in 1990.

Despite the many accolades the system has received over the years, it does have its critics. The cost overruns and delays during its construction did not go unnoticed, and some detractors blame the Interstate for catalyzing suburban sprawl and the decline of inner cities, encouraging a national dependence on foreign oil, and a host of other ills. Highway aesthetics have also drawn some negative assessments. The author Charles Kuralt remarked, "It is now possible to travel from coast to coast without seeing anything. From the Interstate, America is all steel guardrails and plastic signs, and every place looks and feels and sounds and smells like every other place."

Today, the Interstate System faces immense challenges. Funding has become a fraught issue in recent years. Since 1993, 22 percent of highway revenue has been raised through a tax on gas of eighteen cents per gallon. Prior to 2000, when gas was much cheaper and cars were less fuel efficient, more gas was consumed and more taxes generated funds to construct and maintain highways. In the past decade, however, fuel-economy standards have improved while gas prices have soared. As a consequence, people are now driving less, in more fuel-efficient vehicles. This has created a shortfall in the Highway Trust Fund. From 2007 to 2010, Highway Trust Fund revenue fell by nearly 15 percent. To make up for the diminishing returns, Congress infused $34 billion in revenue from other sources into the trust fund between 2009 and 2011. Even with that outlay, funding gaps remain. In 2011, the Highway Trust Fund ran a deficit of $8 billion. That figure is expected to rise to $10 billion for 2012.

According to the Congressional Budget Office (CBO), unless other measures are instituted, the Highway Trust Fund could be tapped out by October 2012. This

would mean that the states might receive delayed reimbursement—or potentially no reimbursement at all—for their highway projects. In light of the 2008 global financial crisis and the subsequent recession, many states are cash-strapped, so any delay could be painful. As Jack Basso, CFO of the American Association of State Highway and Transportation Official, comments, "This is just straight math—there is no guessing about it . . . A couple of weeks wouldn't cause any big economic disruptions, but if it goes on for a couple of months it becomes a huge cash flow problem for the states."

Meanwhile, the federal government is at an impasse as to how to address the funding deficit. The Obama administration has pledged to find additional revenue, but ruled out raising the tax on gasoline, while congressional Republicans have declared their opposition to injecting more cash into the Highway Trust Fund from other sources. They have proposed raising revenue from domestic energy production, but skeptics doubt such a plan would come close to generating the necessary funds.

The funding shortfall is not limited to the Interstate System. The United States is connected by over four million miles of roads, and many claim these are not being properly maintained. Unlike the Interstate, most of these thoroughfares are the responsibility of state and local governments, so there is no Highway Trust Fund or other federal assistance to fall back on. The scope of the revenue dilemma is a matter of some debate, but the worst-case scenarios suggest that roads are underfunded to the tune of hundreds of billions of dollars

In 2009, the ASCE issued its Report Card for American Infrastructure. American roads and highways received a D–. According to ASCE, 33 percent of major American roads are in mediocre or poor condition; 36 percent of major US highways suffer from congestion. According to the ASCE's diagnosis, American roads required $930 billion in improvements over five years to be brought up to standard. Only an estimated $380.5 billion was budgeted, indicating a shortfall of nearly $550 billion. With the uncertain economic times, a lack of revenue at the state, local, and federal levels, and a widespread aversion to tax increases, it is unlikely the roadways will receive the influx of cash necessary to meet ASCE's standards in the near future.

The consequences of underfunded roads are the same today as they were during the First Transcontinental Motor Convoy. Poorly built and maintained roadways lead to delays, accidents, injuries, and even deaths, exacting a high economic toll, as well as a steep human cost. In 2007 alone, for example, over 41,000 people were killed in automobile accidents, with nearly 2.5 million suffering injuries. Such troubling figures point to the national security dimensions of road and highway conditions. Eisenhower recognized as much more than half a century ago, but he took it one step further, seeing in a national highway network a means of not only defending the country but of unifying it. "Together, the united forces of our communication and transportation systems are dynamic elements in the very name we bear—United States," he remarked. "Without them, we would be a mere alliance of many separate parts."

# For What the Tolls Pay

## Fair and Efficient Highway Charges

By Rudolph G. Penner
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Hydrogen cars, expensive oil, fuel efficiency standards, and inflation frighten those interested in maintaining and improving U.S. highways. All of these forces could erode the real value of fuel taxes that now are the largest single source of funding for highway programs and an important source of transit funding as well. Because of this worry, the Transportation Research Board convened a committee to carefully examine the future of the fuel tax.

The committee uncovered both good and bad news. The good news is that there is nothing structurally wrong with the fuel tax that will cause the real value of revenues to decline dramatically over the next couple of decades. The bad news is that it is a very crude way to raise revenues for our highway system. Switching to per-mile fees, the committee concluded, would be a much more efficient and equitable approach.

Looking at the good news first, worries that alternative fuels and improving fuel efficiency will undermine the finance system are definitely exaggerated. Radical improvements in efficiency will take a long time to develop and be implemented, and even less radical improvements, such as hybrid engines, affect fuel consumption very slowly because it takes so long for new models to replace old models in the U.S. car fleet. Moreover, Americans are addicted to oil partly because they are addicted to power. If you make an engine more efficient, they will want it bigger. Consequently, improving technology does not reduce real fuel tax revenues per vehicle mile nearly as much as one might think. Indeed, they have been roughly constant for a long time.

One cannot be quite as certain regarding the future price of oil. There is some possibility that demand may erode because of an upward trend in the price of gasoline. Department of Energy projections (which have been generally consistent with those from other prominent sources) are optimistic that the price of oil will not surge over the next 15 years or so. But it must be admitted that energy experts did not anticipate the recent price increase to over $60 per barrel.

However, the evidence strongly suggests that recent oil price increases are as much the result of geopolitical forces as they are the result of fundamental supply shortages. It is true that China and India are becoming major oil consumers

as they grow rapidly, but it is also true that supplies are increasing. There may be limited supplies of the type of oil that we pump from the ground today, but as one expert puts it, the sources of oil will just become heavier and heavier. If light crude runs out, we'll turn more to heavy crude. If that becomes scarce, tar sands will be exploited more fully, and if they become expensive, we'll turn to oil shale. In the process, oil will become more expensive, but it will be a slow process. Of course, wars, boycotts, and other disturbances can cause major price spurts that make optimistic forecasts look foolish, but one has no choice but to base long-run forecasts on fundamental trends, and they are not alarming.

The imposition of severe fuel efficiency standards could upset the gasoline-powered apple cart, but new radical regulation seems politically implausible in the near future. Currently, our two political parties are so closely competitive that no one wants to ask the American people to make major sacrifices. We may be addicted to oil, as the president suggests, but as Mae West remarked, "Too much of a good thing can be wonderful."

## Inflation Concerns

The possibility of accelerating inflation raises more of a political as opposed to a technical concern. The federal fuel tax is a unit tax. That is to say, it does not vary with the price of gasoline as would a percentage sales tax. Inflation therefore erodes the purchasing power value of the tax. Some, like the Chamber of Commerce (in the National Chamber Foundation's 2005 report "Future Highway and Public Transportation Finance"), have suggested indexing the tax for inflation. However, that solution may not be politically sustainable. Politicians at the state and local levels often suspend indexing if it becomes the least bit painful.

Historically, federal and state politicians have compensated for inflation by periodically raising tax rates. There is some question whether this is possible in the severe anti-tax climate in which we live today, but if this is a problem, it has nothing to do with the basic structure of the fuel tax. It is a political problem afflicting all forms of taxation.

But it should also be noted that politicians have not been strongly pressured by inflation in recent years. First, the inflation rate has been extremely low by historical standards. Second, at the federal level, the government has been able to capture additional revenues for the highway system without raising tax rates. In 1993, the federal gas tax was increased for the express purpose of reducing the deficit. The proceeds were not to be spent on highways or anything else. In 1997, those revenues were redirected into the highway trust fund and are now available to finance highway expenditures. More recently, an ethanol subsidy that was previously financed out of the highway trust fund will, in the future, be financed out of general revenues, thus releasing more resources for highways.

Congress may now have run out of such devices for increasing federal highway funding, which supports about a quarter of all highway spending. It will be interesting to see how Congress reacts in the future, especially if inflation accelerates a bit. In addition, many think that the most recent federal highway bill will more than

spend the earmarked revenues that are available, although this is a controversial issue. If true, that, along with more inflation, may pressure Congress to return to its historical practice of occasionally raising the fuel tax when the federal highway program is reauthorized.

## Per-Mile Fees

Although there are few reasons to fear a rapid erosion of fuel tax revenues in the near future, major revenue increases also seem unlikely. Congress and the state legislatures could raise more revenue with the gas tax if they chose to do so, but the political opposition is formidable. That makes it unlikely that enough will be spent in the near future to improve highway quality significantly, and the nation will have to continue to live with the current level of congestion. But relying solely on increased highway expenditures to reduce congestion is probably not cost-effective. Congestion must also be attacked by imposing extra costs on those who cause it.

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Whether the nation just wants to maintain the quality of the current system or to improve it, there is good reason to reform our current approach to financing. In searching for alternatives, there is a strong argument for sticking with the established principle that users should pay and that the resulting revenues should be dedicated to highway expenditures. The revenues collected should be related to the costs that the vehicle imposes on the system, including congestion costs. In an extreme version of the principle, all the revenues and no more should be spent on highways, but the present practice of dedicating some revenues to mass transit certainly is defensible, because mass transit expenditures benefit highway users by reducing congestion.

The current fuel tax is only vaguely related to the amount of wear and tear that a vehicle imposes on the road, and it does not vary with the level of congestion. Per-mile fees that vary with the type of vehicle and time of day would be much more efficient and equitable.

Fifteen years ago, it was not possible to think about collecting per-mile fees efficiently. Costs included constructing tollbooths, paying toll takers, and most important, waiting in line at the tollgate. New technology holds the promise of virtually eliminating such costs.

In the immediate future, developments such as the EZpass electronic toll collection system (used on many toll roads and bridges throughout the northeastern states) and license plate imaging greatly increase the opportunities for tolling at low cost. We should exploit these opportunities to the extent possible.

In the longer run, global positioning system (GPS) technology makes it theoretically possible to charge for every road in the country, with fees varying by type of

vehicle and the level of congestion. Of course, we may never wish to go that far, and much research is necessary before committing to that path. It is necessary to determine what type of technology is most efficient and to develop safeguards that will assure the public that their privacy will be protected. It is also important to resolve the many problems that will arise as we move from the current system of financing to something completely new. The necessary technology is not costless to develop, but it is very cheap. It is possible that GPS systems will be installed in almost all new cars in the near future, even if they are not required for the purpose of levying a per-mile fee.

The president's 2007 budget proposal agrees that new forms of highway funding are desirable. It requests $100 million for a pilot program to involve up to five states in evaluating more efficient pricing systems. The necessary research has already started with an experiment in Oregon, and the Germans have initiated a GPS system for levying fees on trucks on the Autobahn, the national motorway system.

An improved pricing system not only has the potential for greatly increasing the efficiency of using existing roads, it can also be helpful in guiding the allocation of new highway investment. If a certain segment of road is yielding revenues far in excess of the cost of building it, it is a pretty good indication that an expansion of capacity in the area is warranted. If, on the other hand, revenues are not sufficient to pay for costs, any request for new construction should be critically examined.

Although such a system holds the promise of implementing the economist's dream of perfectly pricing the highway system, it would be naive to believe that a perfect system could ever be implemented. The per-mile fees will be set by politicians operating in a political environment. There will be strong pressures to keep fees low just as there are pressures today to avoid fuel tax increases. In some cases, there will be legitimate arguments for subsidies. For example, the nation may choose to subsidize rural road networks much as it now subsidizes mail service to rural areas.

## The Equity Argument

Many will question charging per-mile fees out of a concern that it will impose a special hardship on the poor. As the notion of charging for road use is discussed more and more, there are many derogatory comments about "Lexus lanes," as though only the rich would benefit from a reduction in congestion. It can be noted that it is frequently extremely important for poorer people to get to work on time or to pick up their kids from childcare before overtime fees are charged. But such arguments do not resolve the problem. Some people will be worse off as the result of a per-mile fee, and some of the people who are worse off will be poor.

It is not uncommon to face tradeoffs between economic efficiency and a concern for equity. But there are better ways to protect the poor than to prevent a major improvement in the efficiency of our transportation system. If it is determined that fees particularly hurt the poor—and more research on this question is probably warranted, given that the poor also pay the current fuel tax—policies that make the earned income credit or other welfare programs more generous can be considered.

If it is deemed desirable to target additional assistance more precisely on poor highway users, a toll stamp equivalent to the food stamp program might be contemplated, although administrative costs would be very high. It may not be worth it to try for very precise targeting. The basic point is that there are other ways to deal with poverty that are more efficient than not charging properly for roads.

Expanding tolling now would acquaint people with the concept. It is easier to start levying tolls on specific lanes when there are alternative lanes that are free. That will make the public aware of the benefits of congestion pricing. If there are no howls of anguish, politicians might be less inclined to oppose road pricing.

Many years ago, the economist William Vickery began extolling the virtues of per-mile fees that would vary with the level of congestion. Having been trained in engineering originally, he went so far as to provide detailed discussions of complex systems that would put wires under the street for the purpose of measuring the distance traveled by particular cars at different times of the day. He died tragically just before traveling to Stockholm to receive the Nobel Prize in economics. At the time, we were on the edge of developing new technology that could turn his dream into a practical reality at low cost. Wherever he is, he must be smiling.

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