Fix It First, Expand It Second, Reward It Third: A New Strategy for America’s Highways

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Introduction

The most important links have already been built and now require significant investments in maintenance and repair.
Deployment of the US Interstate Highway System

FIGURE 3
Source: FHWA
Note: Half of the interstate highway system is from 1965 or before. Unless something is done, failure will be more frequent, the Interstate system is aging and nearing the end of useful life for many components.

FIGURE 4
Structurally Deficient Bridges on the U.S. National Highway System
Source: DOT 2007b
Structurally Deficient Bridges on US National Highway System

Source: DOT 2007b
Typical Pavement Lifecycle Curve

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around its interchanges. Local productivity is higher in areas where the highway was completed earlier (Fernald 1999). Such highways have led to new suburban population centers (Baum-Snow 2007). On the cost side, several factors arise. Although there is no transparent top-line number that shows the scope of our maintenance deficit, the weight of the evidence indicates we are not allocating enough to maintenance.

The extreme case of the collapse of the I-35W Mississippi River Bridge in Minneapolis illustrates the point (Box 2). The cost of retrofitting the bridge with new gusset plates, while not free, and improving bridge redundancy (the bridge was designed as fracture critical, and so failure at a single point would result in failure of the whole), would have been far less than the cost of rush building a new bridge (estimated at $250 million), much less the toll in thirteen lives and 145 injuries, in addition to the anxiety caused for millions who learned about the August 1, 2007, tragedy.

The bridge had been rated "structurally deficient" in 2005 (and this observation was corroborated subsequently when inspections found further cracking and fatigue), indicating it was in need of a major overhaul or replacement (DOT 2008). Despite its poor condition, according to Minnesota Governor Tim Pawlenty, the bridge was not scheduled to be replaced until thirteen years later, in 2020 (Elsen and Sander 2007).

The same logic applies, in a less spectacular fashion, to pavements. Figure 2 shows the extent to which pavements deteriorate over time, and suggests there is a cost-minimizing point of intervention before the pavement deteriorates too much. Research from scholars at Michigan State University suggests that for every $1 spent on preventive pavement maintenance, between $4 and $10 is saved on rehabilitation (CTC & Associates 2003, Baladi et al. 2002).

According to the American Association of State Highway and Transportation Officials (AASHTO), the NHS comprises only 4.1 percent of the nation's total road mileage but carries 44.8 percent of vehicle traffic. Despite its importance, much of the system is not in good repair; approximately 37 percent of NHS miles are in fair, poor, or very poor condition (FHWA 2008b). Figure 3 shows the average age of infrastructure on the U.S. Interstate Highway system is more than forty-five years old.

While there has been some progress in reducing the number of structurally deficient bridges and in replacing fracture-critical bridges, there is much to be done, and the problem worsens each year as unreplaced and unrepaired bridges age. To illustrate, the Southeast Michigan Council of Governments (a planning organization including the Detroit region) reports that the percent of lane miles in poor condition has increased from less than 10 percent in 2004 to more than 30 percent in 2009, showing just how quickly roads can deteriorate with even a short deferral of maintenance due to the economic downturn (Southeast Michigan Council of Governments 2011).

There are 115,104 bridges on the NHS, which includes interstate bridges. Of these, 5.6 percent are considered structurally deficient, down from 7.9 percent in 1995. AASHTO estimates that a $5.1 billion average annual investment would clear the NHS bridge investment backlog by 2024. This is in addition to the cost to maintain, repair, and rehabilitate bridges that are not on the backlog. Figure 4 shows just how many bridges DOT considers "structurally deficient."

Judging from sources such as the American Society of Civil Engineers (ASCE) Report Card and state performance management systems, evidence abounds that preservation is underfunded; without new revenue sources, or, as in our proposal, a greater share of existing revenues, this problem will magnify.
From **Building** to **Operating**

**Building**
(yesterday)

**Operating and Maintaining**
(today and tomorrow)
Fix it First

- We propose that revenue from the federal gasoline tax no longer fund new highway construction.

- Instead, this revenue would be dedicated to preserving and reconstructing existing highways (on the NHS), which are reaching the end of their design life.
The Hamilton Project  •  Brookings

Step in properly allocating the scarce resource of peak-period road capacity. We anticipate prices will vary with demand, so peak tolls would be higher than off-peak.

There are a number of reasons to move toward pricing, which this proposal facilitates. First is simply revenue. The revenue collected using the gas tax has been declining and will continue to decline with increased fuel efficiency and electrification of the fleet. Some alternative source of funds is required, and a user fee is a reasonable selection here, as pricing is the most direct user fee. Second is allocation of scarce road space. By charging a different amount at different times and locations, a price signal is sent to travelers about when and where to travel to account for the congestion they impose on others. Prices in the off-peak would be lower than prices in the peak, thereby encouraging many travelers who have flexibility about when to travel to choose a different period. Surprisingly, most trips at the peak hour are not work trips (FHWA 2007a). This suggests significant discretion on the part of travelers about time of travel, and a great deal of promise for general time-of-day.

Flowchart: Fix It First

- Highway Trust Fund
- User Fees
- State
- Applies Formula

.flowchartApplies Formula

- Assess Needs
- Funds Highway Trust Fund
- Funds NHS Maintenance Projects
- Transportation is Used

Note: This is a flowchart of resources in the “Fix it First” proposal, which show how the funds from the Highway Trust Fund are distributed by formula to states who repair, rehabilitate, replace and enhance existing facilities infrastructure. Use of those facilities generates user fees (gas taxes now, perhaps vehicle mileage taxes in the future) that are added to the Highway Trust Fund.

Third, the value of shorter travel time depends on the traveler and the nature of his or her trip. A network of HOT lanes that guarantee travel times offer a solution to the problem now faced with lack of choices in travel. There is increasing cumulative international experience with area congestion charges in cities ranging from London, to Stockholm, to Singapore, and HOT lanes are becoming more common in the United States (e.g., SR-91 and I-15 in California, I-394 in Minnesota, and the Katy Freeway in Texas). Such programs are generally popular and reduce congestion. For example, the city of Stockholm introduced a toll system for seven months in 2006, after which citizens voted on its permanent adoption (Harsman and Quigley 2010). In this vote, 52 percent of the Stockholm voters approved continuing the system. Evidence from HOT lanes suggests they are more popular after than before they are opened, and that they are just as popular among low-income groups as they are among and high-income groups (though in general they are used somewhat more by those with higher incomes) (Zmud 2008).
From Funding to Financing

Funding (today)

Federal  →  State
User Fees (Gas Taxes)  →  User Fees (Gas Taxes)

Financing (tomorrow)

Federal  ↔  States, Others
User Fees (Tolls, MBUF), Value Capture  ↔  Bonds, etc.
Expand it Second

- New highways will continue to be built.
- We propose to change the financing rules
- Rather than receiving a 80% Federal subsidy, road owners could borrow (and have to repay from User Fees, Value Capture, and other sources tied to the benefits the project produces) the capital from the newly capitalized Federal Highway Bank
- A major change in incentives
We introduce formal performance standards for ranking investments

Formal criteria related to safety performance, pollution, and speed and accessibility will be evaluated by an impartial evaluator

Projects that perform well on these criteria will receive an interest rate reduction
There are three primary reasons to tie user charges to new capacity.

• First, we seek to ensure there is a source of revenue from beneficiaries, and users are the foremost beneficiaries of any project. Tying costs to the people who benefit from using new infrastructure is both a more fair and a more efficient way to finance new capacity. There are many ways to ensure goals of equity. We discuss some examples in “Questions and Concerns” below.

• Second, we seek to use pricing as an instrument to manage capacity. With demand-varying road prices, some discretionary travelers will switch from the peak to the off-peak travel periods. Since (as noted above) most travel in the peak is non-work-related, there is good reason to believe that even small differences in the price by time of day will have large effects on congestion.

• Third, by pricing selected facilities (or selected lanes) to ensure free-flow conditions (thereby creating the same vehicular throughput as congested conditions at a faster speed, overall a win-win), we can provide facilities (and ultimately a network) that allows travelers to pay extra and thereby avoid congestion, introducing choice, and addressing the reliability problems we raised in the Introduction above. These routes, now in limited deployment as HOT lanes, can see much wider use, but require new capacity in places to be able to bypass bottlenecks. HOT lanes benefit more than just motorists: they can also be used to provide rapid bus transit networks throughout metropolitan areas. These express buses will face freely flowing travel conditions throughout the peak period, and thus have a time advantage over buses running on surface streets and cars not paying the toll.
Federal Highway Bank and PPP

- Who receives the loans, who implements the project?

- Private firms and public agencies that have the ability to repay loans from user fees or value capture are eligible. They are “on the hook” for the loans.

- Private individuals and organizations invest in the bank, and expect returns.

- The entire system is in some senses a Public Private Partnership
Thank you

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