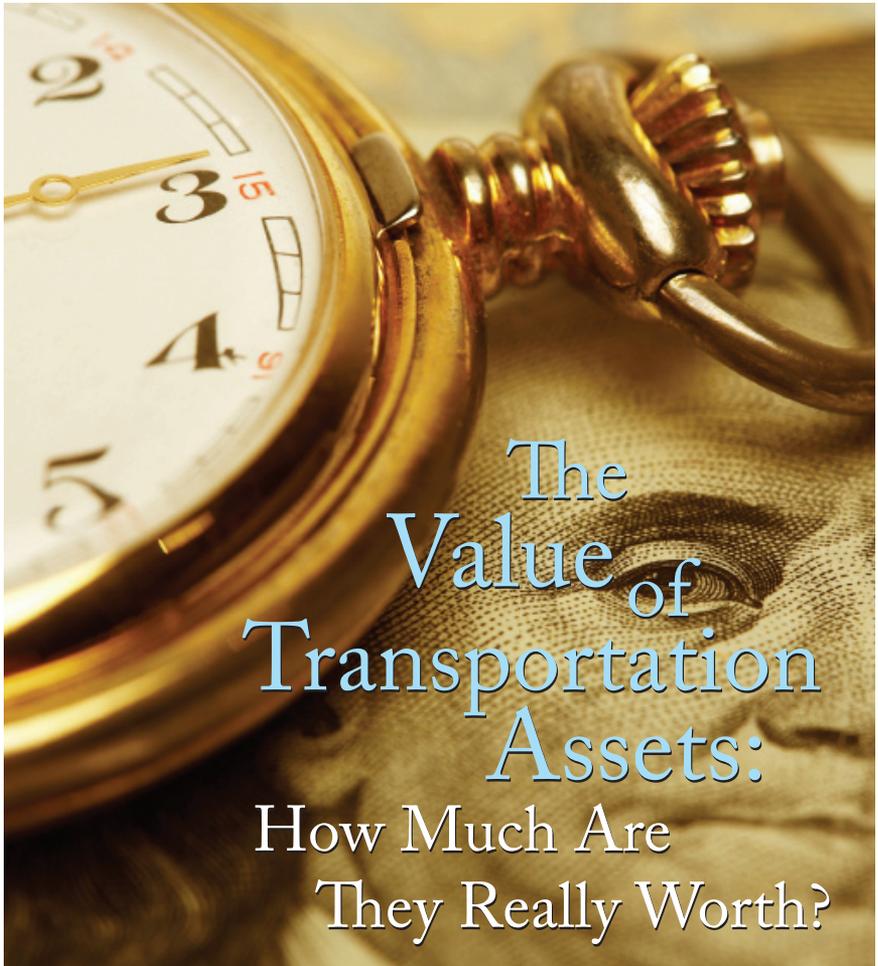


HORIZON

THE FUTURE OF TRANSPORTATION

A PUBLICATION OF THE TEXAS DEPARTMENT OF TRANSPORTATION

WINTER 2008



The Value of Transportation Assets: How Much Are They Really Worth?

The State of the Union – Crumbling :: Our Legacy of Neglect: The Longfellow Bridge and the Cost of Deferred Maintenance :: Economic Growth Benefits of Transportation Infrastructure Investment :: Raising Gas Taxes Won't Fix Our Bridges ::
ON THE HORIZON: Finance Commission Interim Report



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HORIZON

THE FUTURE OF TRANSPORTATION

“Roads are the veins and arteries of the body politic, for through them flow the agricultural productions and the commercial supplies which are the lifeblood of the state... But roads belong to that unappreciated class of blessings, of which the value and importance are not fully felt because of the very greatness of their advantages, which are so manifold and indispensable, as to have rendered their extent almost universal and their origin forgotten.”

W.M. Gillespie, professor of civil engineering
Union College, 1849

As the words above reveal, the economic and social importance of American transportation infrastructure (roads, highways, bridges, tunnels, airports, rail services, ports, etc.) cannot be overstated. It supports economic activity and a high quality of life in the U.S. Even with the emergence of electronic commerce, people and goods must all still travel on the transportation network.

Historically, the most developed nations enjoy a strong relationship between economic growth and the quality of infrastructure. Years ago, as roads and bridges were built and delivered, public interest was high and investment followed. But over time, the ubiquitous nature and slow aging of these structures led to the popular misconception that they were permanent and their costs were finite. Public expenditure on infrastructure has flattened over the last 20 years. Little regard was given to what would happen as they neared the end of their service lives, a fact tragically illustrated by last year’s bridge collapse in Minneapolis. As the system ages, maintenance costs continue to rise, leaving a greater set of challenges for our transportation network and those who rely on it.

In this issue, HORIZON presents articles that focus on the current state of our infrastructure and the necessity of ongoing investment. In his article, “The State of the Union – Crumbling,” Stateline.org reporter Eric Kelderman provides an overview of

how badly U.S. facilities have fared in recent years. His article is followed by selected excerpts from “Our Legacy of Neglect: The Longfellow Bridge and the Cost of Deferred Maintenance.” Merrimack College professor Dave Westerling and Pioneer Institute Research Director Steve Poftak use a single bridge to spotlight the effects of ignoring maintenance needs. Next, Dr. John Taylor of the Mackinac Center for Public Policy points to some of the economic benefits generated by increased transportation investment. Finally, Dr. Adrian Moore of the Reason Foundation explains why higher state and federal gas taxes are not effective ways to raise revenue for infrastructure investment.

To keep you abreast on the latest developments in transportation policy, our ON THE HORIZON section presents a summary of the interim report released in February by the National Surface Transportation Infrastructure Financing Commission, the body tasked by Congress to evaluate the current approach to funding transportation infrastructure and recommend options.

The funding and preservation of our transportation network will be among the many issues discussed at the upcoming Texas Transportation Forum on April 20-22, 2008. We hope that you will join us in Austin to take part in this important discussion. We look forward to seeing all of you there.

Sincerely,



Amadeo Saenz, Jr., P.E.
Executive Director
Texas Department of Transportation



The State of the Union – Crumbling

by Eric Kelderman, Stateline.org

*To view the original article, please visit:
<http://www.stateline.org/live/details/story?contentId=270952>*

The numbers are staggering. More than one in four of America's nearly 600,000 bridges need significant repairs or are burdened with more traffic than they were designed to carry, according to the U.S. Department of Transportation.

A third of the country's major roadways are in substandard condition—a significant factor in a third of the more than 43,000 traffic fatalities each year, according to 2005 data from the National Highway Traffic Safety Administration. Traffic jams waste 4

billion hours of commuters' time and nearly 3 billion gallons of gasoline a year, the Texas Transportation Institute calculates.

Dams, too, are at risk. The number of dams that could fail has grown 134 percent since 1999 to 3,346, and more than 1,300 of those are "high-hazard," meaning their collapse would threaten lives, the Association of State Dam Safety Officials (ASDSO) found. More than a third of dam failures or near failures since 1874 have happened in the last decade.

This article appears within "State of the States 2008," Stateline.org's annual report on significant state policy developments and trends. It appears with permission of the author and Stateline.org.

Stateline.org

U.S. Dam Failures Since 2000

Since 2000, more than 40 dam have failed in 16 states. These incidents have ranged from single dam failures with no fatalities to the failure of the Lake Pontchartrain levees in the wake of Hurricane Katrina.



Source: Association of Dam Safety Officials

Underground, aging and inadequate sewer systems spill an estimated 1.26 trillion gallons of untreated sewage every year, resulting in an estimated \$50.6 billion in cleanup costs, according to the U.S. Environmental Protection Agency.

“Much of America is held together by Scotch tape, bailing wire and prayers,” said Donald F. Kettl, director of the Fels Institute of Government at the University of Pennsylvania.

Fixing these problems and others threatening the nation’s critical infrastructure would cost \$1.6 trillion — more than half of the annual federal budget, the American Society of Civil Engineers (ASCE) estimates. And that doesn’t include what it will cost for new capacity to serve a growing population.

Recognizing the importance of structures so integral to U.S. commerce and Americans’ well-being and safety, local, state and federal governments already are budgeting nearly two-thirds of the \$1.6 trillion needed for infrastructure work. The problem is they raid many of those funds for other purposes, ASCE says.

Coming up with new money to fill the funding gap has become a political nightmare, with politicians and the public trying to avoid anything that looks like a higher tax.

“We have convinced ourselves that infrastructure is free, that someone else should be paying or that we have paid our share,” said Mike Pagano, an urban

planning expert at the University of Illinois at Chicago.

Infrastructure is the four-syllable jawbreaker that governments use to describe the concrete, stone, steel, wires and wood that Americans rely on every day but barely notice until something goes awry. Broadly speaking, it includes airports, the electrical energy grid, hazardous and solid waste storage sites, navigable inland waterways, public parks, schools and even the security to protect all of those structures.

“We have convinced ourselves that infrastructure is free, that someone else should be paying or that we have paid our share.”

Mike Pagano, urban planning expert at the University of Illinois at Chicago.

While the federal government bears the broadest responsibility to keep America’s gears turning, state and local governments are accountable for supplying more than half of the money and all of the manpower to build and maintain the country’s vast ground transportation network. States also have regulatory oversight of 85 percent of dams and help fund drinking-water and wastewater systems. Federal and state officials share the blame for shortfalls in America’s maintenance budget. Congress hasn’t raised the federal gasoline tax of 18.4 cents per gallon — which pays for about 45 percent of all road construction — since 1993, nor have many state leaders been willing to charge drivers more at the pump to pay for local road repairs.

The association of state dam officials contends that most state dam safety programs are underfunded, understaffed and often don't have adequate authority to regulate safety standards or emergency plans. Likewise, the federal dam safety program, which helps pay for the upkeep of structures, never has been fully funded by Congress.

The EPA estimates that the nation is falling short on water infrastructure by \$22 billion annually. The federal Clean Water State Revolving Fund, which makes low-interest loans to clean up or protect water supplies, has shrunk from more than \$3 billion in 1990 to roughly \$1 billion in 2007.

The consequences of skimping can be dire:

- On Aug. 1, 2007, the Interstate 35 bridge in downtown Minneapolis collapsed into the Mississippi River, killing 13 people and injuring at least 80. Losing the state's most heavily traveled bridge is costing an estimated \$400,000 daily in extra commuting time and gasoline, said Brian McClung, a spokesman for Minnesota Gov. Tim Pawlenty (R). *(A report issued Jan. 15 by the National Transportation Safety Board blamed the bridge collapse on inadequate steel "gusset" plates that hold the structures angled beams together.)*
- Steam pipe explosions in Midtown Manhattan last summer killed one person, injured dozens and disrupted businesses.
- In March 2006, the 116-year-old Kaloko Reservoir Dam in Hawaii collapsed after heavy rains, killing seven people and causing nearly \$15 million in damage.

Stateline.org
Ranking the U.S.
 The World Economic Forum scored countries on a 1-to-7 scale based on its analysis of a nation's quality of roads, railroads, ports, air transport, electricity supply and telephone communication infrastructure.

1. Germany	(6.65)
2. France	(6.46)
3. Singapore	(6.36)
4. Switzerland	(6.32)
5. Hong Kong SAR	(6.24)
6. United States	(6.10)
7. Denmark	(6.10)
8. Canada	(6.05)
9. Japan	(5.98)
10. Finland	(5.84)

Graphic by
Danny Dougherty, Stateline.org

Source: World Economic Forum, November 2007

- In August 2005, after Hurricane Katrina, levees holding back Lake Pontchartrain gave way, flooding major parts of New Orleans. The storm and flooding are blamed for more than a thousand deaths and more than \$100 billion in damage.
- In May 2002, the Interstate 40 bridge near Webbers Falls, Okla., collapsed into the Arkansas River, killing 14 people.

Despite urgent calls to prevent more tragedy from failed infrastructure, politicians and voters have signaled they are gunshy of new taxes. After the collapse of the Minneapolis bridge, Minnesota politicians

failed to agree to a statewide transportation package, putting off to the 2008 legislative session more debate over a proposed 5-cent hike in the state's gasoline tax. Gov. Tim Pawlenty twice vetoed gas-tax hikes before the bridge fell.

Washington state voters in 2006 did pass a 9.5-cent increase in the state's gas tax, but last year passed a follow-up measure to require a two-thirds vote in the Legislature or voter approval for any tax increases.

To begin to address their transportation problems, state governments are borrowing more money, adding user fees such as tolls, and striking deals with private companies, including leasing state assets.

Proposals to pay for bridge and road repairs with tolling are on the upsurge with politicians — though not with the public, especially in Pennsylvania. There, Democratic Gov. Ed Rendell last year pushed through a plan to add tolls to a section of Interstate 80 to collect \$950 million a year for transportation projects. But a slew of civic groups fear tolls will discourage tourism and trucking along the I-80 corridor and have asked state and federal lawmakers to reconsider.

To begin to address their transportation problems, state governments are borrowing more money, adding user fees such as tolls, and striking deals with private companies, including leasing state assets.

Rendell has said that if tolls are junked, he will fall back on a plan to lease the Pennsylvania Turnpike to a private company, similar to Republican Gov. Mitch Daniels' 2006 lease of the Indiana Toll Road to a foreign firm for a whopping \$3.8 billion. Political backlash over that deal became a factor in the 2006 elections, when Democrats recaptured a majority in the Indiana House. Daniels subsequently shelved two smaller proposals for privately built and managed toll roads in the Hoosier State.

But many other states continue to barrel down the path of privatization as more allow for-profit firms to lease, design, build and operate public infrastructure — options that are more widespread in other developed countries. In the United Kingdom, for example, 10 percent to 13 percent of all infrastructure projects involve some public-private partnership, according to Deloitte Services, LP, part of a worldwide consulting firm.

In the United States, more than \$21 billion in public-private transportation deals have been signed in the past dozen years, with projects in California, Florida, Texas and Virginia accounting for half of that amount. Also, more than 25,000 water and wastewater systems are managed privately, according to a 2006 Deloitte report.

One new cutting-edge program will let Missouri repair or replace 800 of its small and medium-sized bridges within five years. The state will choose a team of private contractors to finance construction costs up front and maintain the structures for

25 years. The Show Me State will pay back the builders annually for a quarter century, costing the state at least double the initial construction costs but providing a quick fix for ailing bridges. The plan spares lawmakers from seeking higher gasoline taxes or new tolls.

California Gov. Arnold Schwarzenegger (R) is calling for legislation to encourage more public-private partnerships to handle \$500 billion in public projects that he says are needed over the next 20 years. That plan follows his success in 2006 in convincing voters to approve more than \$40 billion in bonds for transportation, water and school-building projects.

In 2007, Texans approved more than \$6 billion in bonds for roads, flood control and clean-water projects.

Overall, states' debts nearly doubled between 2000 and 2005, from \$1 billion to \$1.9 billion, according to Federal Reserve Board data.

Using bonds to pay for capital projects can be a worthwhile reason for debt because the results provide long-term public and economic benefits, said Sujit Canaga Retna, a fiscal analyst for the Council of State Governments. However, Chris Edwards, who studies budget issues at the libertarian Cato Institute, argues that debt, even to finance infrastructure, just defers the tax bill. Instead, he favors the privatization approach.

One of the chief challenges facing infrastructure is simply age. Much of the

nation's transportation infrastructure was erected in the boom days after World War II and is reaching the end of its life cycle.

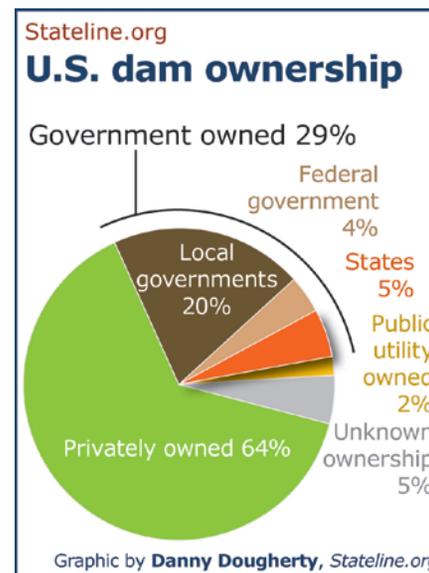
Half of the nation's bridges were built before 1964, when the ill-fated Minneapolis bridge was constructed. More than half of the bridges in Rhode Island and Massachusetts also are rated deficient or obsolete, according to the U.S. Transportation Department.

More than a third of the nation's nearly 83,000 dams already are 50 years old, and within a decade, 60 percent will reach the half-century mark.

Much of the nation's transportation infrastructure was erected in the boom days after World War II and is reaching the end of its life cycle.

Cast-iron pipes from the 19th century still carry water to sinks in some of the nation's oldest cities and are overdue to be replaced, according to the American Water Works Association. Although it has not done a state-by-state survey, the association estimates that replacing worn-out water pipes will cost \$250 billion over 30 years. In November, Congress overrode President Bush's veto to authorize up to \$23 billion over 15 years for water projects.

Another worry is that the nation's growing population is creating a need for more capacity. Today, 246 million cars — 278 percent more than 50 years ago — are forced to squeeze onto 47,000 miles of interstate that have increased only 15 percent during the last half-century.



Source: Association of State Dam Safety Officials

New Jersey has the most snarled traffic in the country with congestion choking 58 percent of its urban roads and 52 percent of rural roads, according to an analysis of federal data by The Road Information Project.

To handle growing transportation needs, the federal highway system will have to double during the next 50 years and public transportation ridership should double within 20 years, according to recommendations from the American Association of State Highway and Transportation Officials (AASHTO). Railways should be prepared to handle a 63 percent increase in freight by 2035, the association estimated.

Besides stretching the country's infrastructure to its limits, the growing population puts more people in harm's way when something goes wrong. Development

in floodplains and below dams has contributed to the fast-rising costs of flood damage, now an annual \$6 billion, according to the Association of State Floodplain Managers.

Dams are a major concern for states, which have regulatory oversight of 85 percent of those structures even though nearly two-thirds are privately owned. The federal government monitors the other 15 percent, mostly major hydro-power generators such as the massive Hoover Dam on the Colorado River.

Ohio has the highest percentage of dams listed as deficient, with 48 percent, according to data compiled by ASDSO. Indiana is second, with nearly 45 percent of its dams rated in need of repair. States set their own standards for rating dam safety.

Another challenge is that infrastructure repairs simply aren't as sexy as ribbon-cuttings. The public and politicians are more likely to support new construction, leaving existing structures wanting, said Pagano, the urban planning expert in Chicago. It's like buying a car and budgeting only for the purchase price, ignoring the costs of insurance, fuel, oil changes and new tires, he said.

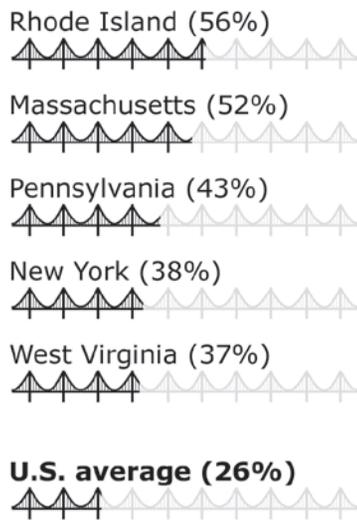
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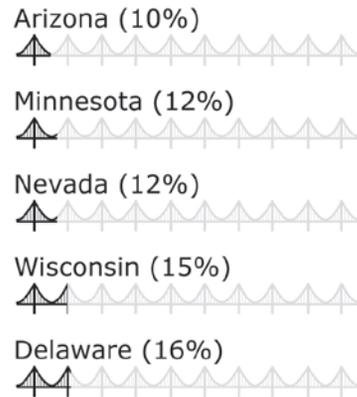
Deficient bridges

Slightly more than one in four bridges either require significant repairs or are no longer adequate for the amount of traffic they carry, according to the U.S. Department of Transportation's 2006 National Bridge Inventory.

States with the most obsolete or deficient bridges



States with the fewest obsolete or deficient bridges



Graphic by
Danny Dougherty, Stateline.org

Source: U.S. Department of Transportation

Overall, rehabilitating a dilapidated structure can cost six to 20 times more than routine maintenance would have cost, Deloitte's analysts found.

For example, the Minnesota bridge that collapsed last August had been tagged "structurally deficient" in 1990. But the state deferred a \$1.5 million steel-reinforcement project scheduled for 2006 and ordered more frequent inspections. The cost to build a new bridge is slated at \$250 million.

States also are skimping on staff to check up on existing structures. Minnesota had 77 bridge inspectors for 14,000 bridges. "There aren't enough hours in the workday for 77 inspectors to check 14,000 bridges the way we should" with an inspection every two years, Minnesota bridge inspector Bart Andersen testified on Capitol Hill.

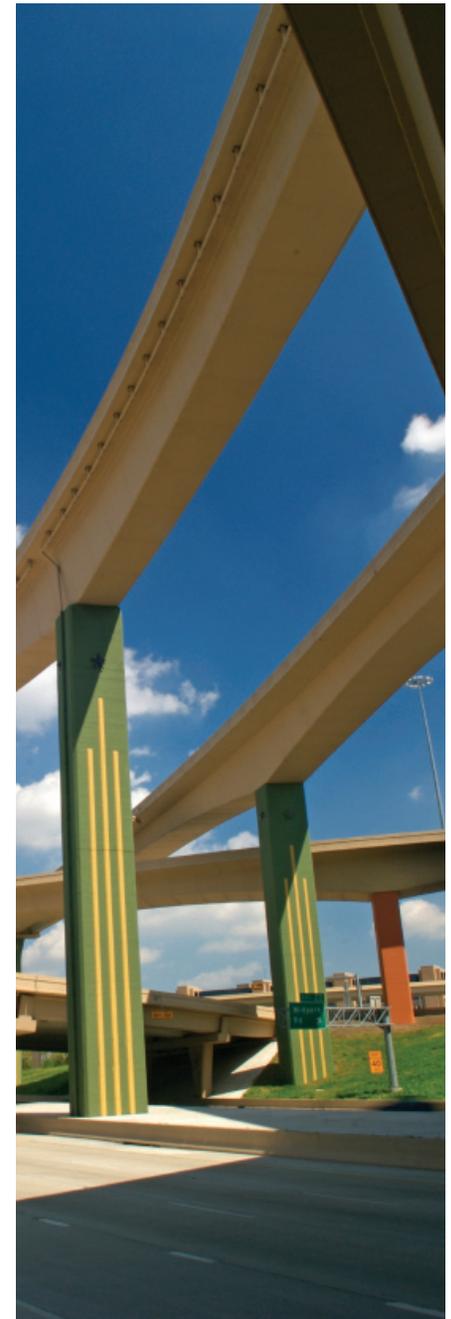
Road-building costs are projected to increase more than 70 percent between 1993, when federal gas taxes were last increased, and 2015.

One problem of paying for repairs is that the pot of money for improvements is steadily shrinking in value, if not in size.

Matthew L. Garrett, director of the Oregon Department of Transportation, said that even with a growing number of taxpayers, revenues aren't keeping pace with the bills. Spending on bricks-and-mortar projects equaled about 2 percent of per-capita personal income in the 1950s and 1960s but has shrunk to less than 1 percent, Garrett said.

Compounding the problem, prices for steel, concrete and land have grown rapidly in recent years. Road-building costs are projected to increase more than 70 percent between 1993, when federal gas taxes were last increased, and 2015, according to an AASHTO report. The association estimates that federal gasoline taxes would have to rise 10 cents to 28.4 cents per gallon by 2015 just to keep up with maintenance.

Eric Kelderman is a staff writer for Stateline.org, a nonpartisan, nonprofit Washington-based journalism project funded by the Pew Charitable Trusts.





Our Legacy of Neglect: The Longfellow Bridge and the Cost of Deferred Maintenance

by David Westerling and Steve Poftak
Pioneer Institute White Paper No. 40, July 2007

Bridges are the physical manifestation of vital connections between communities. The Longfellow Bridge connects two economic and cultural powerhouses – Boston and Cambridge – yet suffers from such neglect and disrepair that reconstruction may cost several times more than the price of simply building a new bridge.

The bridge's problems, clearly visible to the naked eye but even more dramatic below the surface, are symptomatic of a statewide failure to maintain our public

assets. This deferral of maintenance is caused by a number of factors:

- Unwillingness to prioritize maintenance over new projects.
- Diffusion of responsibility for assets across disparate public entities.
- Political incentives that discourage spending on maintenance.

The result is a wasteful shortening of service life, a dysfunctional asset construction scheme, and ultimately, diminished quality of life for the Commonwealth's citizens.

This article is presented with permission from the Pioneer Institute. It contains excerpts from the original version. To view the original article, please visit: http://www.pioneerinstitute.org/pdf/070731_poftak_longfellow.pdf

THE LIFE OF THE LONGFELLOW BRIDGE: 1907-2007

History

Transportation between Boston and Cambridge has been important since the earliest days of English settlement in Massachusetts. Three structures have been built over the Charles River where the Longfellow Bridge currently stands.

A wooden bridge built in 1792 was replaced in 1854 by a second wooden bridge. The bridge that stands today was constructed out of granite and steel in 1907. The first bridge was immortalized in Henry Wadsworth Longfellow's poem "The Bridge."

Massachusetts Governor John Hancock ratified incorporation of the West Boston Bridge Corporation in 1792. Construction began on a causeway on July 15, 1792 and work on a wooden bridge began on April 6, 1793. The proprietors of the West Boston Bridge opened it to the public on November 23, 1793.



Tolls were collected for 40 years, after which the bridge was turned over to the Commonwealth. The wooden bridge was completely rebuilt in 1854 and transferred to the City of Cambridge by an act passed in 1857.

This bridge lasted until 1899, when a temporary bridge was built and work began on the granite and steel bridge that stands today. Construction began in 1900 with the placing of 20,168 wooden piles in the riverbed for the 10 stone and concrete piers, and the abutments on each bank. Erection of the steel superstructure was completed by the Phoenix Bridge Company in November 1904, and surfacing of the roadway finished approximately a year later. Total cost for the bridge was \$2,654,896, which equates to \$137,809,259 in 2007 dollars.

The Bridge Today

A century later, the Longfellow Bridge carries over 49,500 vehicles per day, plus an estimated 97,000

daily MBTA (Massachusetts Bay Transportation Authority) Red Line transit passengers. This traffic volume means that the Longfellow is subject to a bridge inspection program. Though the bridge falls under the jurisdiction of the Commonwealth's Department of Conservation and Recreation (DCR), the Massachusetts Highway Department (MHD) assists DCR with inspection of bridges under its jurisdiction.

The Longfellow has undergone two repair projects; first in 1959, and then again in 2002. The 1959 project included some structural repairs and replacements while the 2002 project spent approximately \$1.1 million of the \$3.2 million total on steel repairs and completed sidewalk and street light safety repairs. About \$160,000 was spent on graffiti removal. The most recent inspection of the bridge was done on September 21, 2006.

The inspection report includes remarks about the major components of the bridge including: the bridge deck and approaches, the steel superstructure that supports the deck, and the substructure that includes the river piers, granite towers and abutments. The report also provides remarks on traffic safety and includes 21 photographs taken during the inspection.

- Bridge Deck - The 2006 inspection report described some of the original deck sections as being in "[s]erious condition with large rust holes (100



percent section loss) in the buckle plates with voids due to deterioration of the concrete deck." The term "100 percent section loss" means that portions of the arch ribs have corroded to the extent that 100 percent of the cross section of the rib is rusted away and holes appear in the rib. A 50 percent section loss would mean that half of the rib section was still available for carrying load and holes would not be visible. These conditions are comparable to those of many Interstate bridges whose decks are deteriorating.

- Superstructure - The steel superstructure includes stringers and floor beams that transfer the load of the deck and traffic through posts to the arched beams of the bridge. The 2006 inspection report states that "[t]he stringers are in poor condition with heavy rusting and section loss."

- Floor Beams - The floor beams in all spans show severe corrosion and some have 100 percent section loss in the center section under the MBTA Red Line tracks, which the inspection

report attributes to “[w]ater leaking through the two longitudinal joints in the median.”

- Arch Ribs - The 2006 Inspection Report notes that “[t]he arch ribs have heavy rusting throughout with heavy section loss [in] the top flange outer edges.” Repair plates have been added to the ribs, particularly at the ends near the piers where some of the outer ribs have 100% section loss.

Overall Design and Construction

The Longfellow’s problems are rooted in its design, and the construction methods used to build it. There is a reason that bridges today are built differently than they were a hundred years ago. The most significant drawbacks of the Longfellow’s design involve its foundation and substructure. The Longfellow is built on 20,000 wooden pilings driven into the bed of the Charles River.

Under current engineering practice, steel or concrete piles would be driven down to bedrock, or structural shafts and caissons would be built. This virtually eliminates settlement in new bridges. Water has also affected the granite piers, as the cycle of freezing and thawing has shifted and deteriorated the granite blocks. Most bridges built since 1930 are made of reinforced concrete substructures with steel or concrete superstructures. Granite blocks are no longer used in modern bridges. Block construction requires frequent repointing of the mortar joints to keep

the effects of moisture from eventually shifting the blocks.

NEGLECT VS. MAINTENANCE: WHICH IS CHEAPER?

The 2006 inspection of the Longfellow provides insight into how the bridge has deteriorated since its construction, despite the two rehabilitations in 1959 and 2002. It also enables us to compare the cost of alternate approaches to stewardship of a capital asset. The first, involving minimal upkeep and the renovation or replacement of the bridge after 100 years, is a fact. The second is hypothetical: How much could the Commonwealth have saved by taking proper care of the Longfellow for the past hundred years? This comparison highlights the urgency of changing the way we maintain our infrastructure.

Estimated Costs of Rebuilding or Replacement

The 2006 inspection report – or even a cursory visual inspection of the Bridge – confirms the need for major renovation. The first public meeting on the proposed project was held in May 2006 by MassHighway, and included a presentation on the extent of renovations needed and potential construction scenarios. It was hoped that a final plan could be put in place by 2007 or 2008, in order to allow for construction between 2009 and 2013.

The bridge is considered safe and not in danger of imminent failure, but its deterioration means that action must

be taken within the next few years, before safety concerns may force its closure. Most urgent are the structural deficiencies of the stringers, floor beams and posts, which are rated as “4 (Poor),” on a scale of “1 (Imminent failure)” to “9 (Excellent).”

In addition to these flaws in the superstructure, the reconstruction process will include a thorough investigation of the substructure, including the piers and the wooden pile foundation below them. Evaluation must account for the dead weight of the bridge, traffic and MBTA train loads, wind and snow loads and a consideration of seismic impacts.

A best-case scenario would find that the piers and foundations are still capable of withstanding all loading conditions. The worst-case scenario would be that the piers and foundations would require structural enhancements before the superstructure and deck can be rehabilitated.

The bridge structure and deck will be renovated while maintaining most MBTA Red Line rail service and three of the four lanes of traffic. The entire bridge deck will be removed and replaced in several stages, limiting vehicular and Red Line traffic to alternate lanes while one or more lanes are under construction. Limited construction access will increase the time needed for renovation and may cause some temporary suspension (on weekends) of Red Line service.



The report of the Commonwealth's Transportation Finance Commission, issued on March 28, 2007, estimated repair costs at \$200 million.

Structural members, including the arches, ribs and posts supporting the deck would then be repaired in place or removed and replaced. The bridge seats, where the arches sit on the piers, and the substructure itself may also need to be replaced in certain locations, which could further extend projected construction schedules.

The initial cost estimates are preliminary, since much of the work cannot be precisely estimated until the foundations are exposed. On January 22, 2006, Jon Carlisle, then of the Executive Office of Transportation, stated “[t]he current \$70 million price tag could rise to \$100 million.” Currently, the official Massachusetts Highway Department estimate is \$180 million. The report of the Commonwealth’s Transportation Finance Commission, issued on March 28, 2007, estimated repair costs at \$200 million.

THE REAL COST OF NEGLECT: A STATEWIDE CRISIS

The Longfellow Bridge is a dramatic example of the cost of deferred maintenance. While we have focused on a highway bridge as an example, neglect threatens all types of public assets throughout the Commonwealth.

The Extent of Our Maintenance Backlog

The many agencies and authorities of the Commonwealth own a huge spectrum of assets, from hospitals to parks to dormitories to beaches. According to the Massachusetts Division of Capital Asset Management’s (DCAM) 21 Report on Real Property, dated September 2006, the Commonwealth owns 78,838,841 square feet of buildings and 611,594 acres of land. In the June 2006 Comprehensive Annual Finance Report, the Comptroller’s Office estimates the total depreciated value of state assets at \$24.9 billion. Almost all of these assets suffer from deferred maintenance or lack proper planning and funding to keep them properly maintained. The Office of Facilities Maintenance at DCAM maintains that the state’s overall backlog of deferred maintenance is \$2.2 billion. The problems caused by inadequate maintenance of public infrastructure plague all levels of government. Since asset deterioration occurs gradually, there is a tendency to defer preventative maintenance. Treating maintenance as a discretionary expense, combined with a diffusion of responsibility and outright inability to monitor asset condition, results in a massive and growing maintenance backlog.

Almost all of the Commonwealth's assets suffer from deferred maintenance or lack proper planning and funding to keep properly maintained.

Other recent studies have found comparable problems throughout state government. For instance, the Judiciary has just completed a condition assessment on its 113 facilities. Sixty-eight have deferred maintenance issues that need to be addressed. This work is estimated to cost \$500 million.

Treating maintenance as a discretionary expense, combined with a diffusion of responsibility and outright inability to monitor asset condition, results in a massive and growing maintenance backlog.

As for highway assets, MassHighway lists, under its structurally deficient (SD) bridge program, 501 structurally deficient bridges as of November 2006, 232 of these bridges are being evaluated for repair and of these, 129 are undergoing repair construction. An investment of \$200 million per year is planned to reduce the number of structurally deficient bridges to 443 by the year 2010.

The Transportation Finance Commission (TFC) report has also estimated a “funding gap” based on an analysis of needs and resources over an extended period of time. The TFC’s “gap” is a projection of future needs.

While there are pockets of excellence on maintenance issues, notably the efforts of DCAM’s Office of Facilities Maintenance and MassHighway’s PONTIS system (data and analytical

models for an inventory of the state’s bridges), there appears to be no high-level awareness of the magnitude of the problem of deferred maintenance, or any comprehensive statewide effort to address it in either the legislative or the executive branch of state government.

Political and Bureaucratic Barriers to Reform

Just as the Longfellow Bridge symbolizes the cost of deferred maintenance, the question of who’s responsible for the bridge also highlights a statewide problem. The bridge was initially constructed by the cities of Boston and Cambridge and then operated by the Metropolitan Park System. In 1923, the Metropolitan Park System became the Metropolitan District Commission (MDC), which took on the original work of the Boston water and sewer boards.

In 2003, MDC was merged with the Department of Environmental Management to become the Department of Conservation and Recreation (DCR). This new entity took on responsibilities for state forests and parks, while also overseeing a large portfolio of transportation-related assets, including 164 pedestrian and vehicular bridges.

Under an agreement with MassHighway, eight of DCR’s facilities, including the Longfellow Bridge, are to be rehabilitated at an estimated cost of \$397 million. Ownership would remain with DCR, but responsibility for design

and construction would be in the hands of MassHighway.

As for other state assets, DCAM has some statutory oversight of maintenance activities for state agencies and building authorities. However, the relevant statutes make a critical distinction between state agencies and public agencies. Public agencies are defined to include authorities and other non-executive branch entities. DCAM has only limited ability to compel record-keeping and reporting from public agencies.

The statutory responsibility for maintenance sits with each agency, which is typically charged with the “care,” “control,” or “supervision” of its facilities.

This placement of responsibility creates a conflict, as agency managers and overseers face incentives to spend scarce budget dollars on operations, not maintenance. Meanwhile, facility managers, who are most attuned to maintenance needs, report to agency managers who may not share their priorities.

For state agencies, DCAM’s primary statutory role is in enforcing standards (contained in Massachusetts General Law, Chapter 7, Section 43C). This section provides for yearly reporting of compliance with maintenance standards and empowers DCAM to perform regulatory inspections. An escalating series of sanctions are provided for,

including a take-over of an agency’s maintenance operations by DCAM until standards are met.

As a practical and political matter, DCAM has not utilized these powers. It lacks the funding, staff, and political power to effectively collect money from another agency and manage their maintenance operations for any length of time.

STRATEGIES FOR EFFECTIVE ASSET MAINTENANCE

1. Remove Disincentives for Maintenance Budgeting

Maintenance spending is currently bifurcated between the operating budget (where many departments spend their own funds on maintenance) and the capital budget. For many of the buildings and other non-highway structures in state government, DCAM spends its own capital funds for maintenance projects.

This bifurcation creates a disincentive for agency heads and program managers to spend on routine maintenance. Any maintenance spending from an agency’s operating budget reduces funds available for programs. The postponement of routine maintenance maximizes operating funds available in the current year, but also hastens the failure of capital assets. The eventual failure of the assets will result in an emergency disbursement of capital funds, which are under DCAM’s control and will not impact the agency’s operating budget.

The postponement of routing maintenance maximizes operation funds available in the current year, but also hastens the failure of capital assets.

Thus managers who spend money on maintenance are, in effect, penalized for trying to maintain their assets.

These disincentives for maintenance should be removed by rewarding agency leaders who keep their assets in good condition. An accurate database and reporting system, such as CAMIS (Capital Asset Management Information System), should serve as the basis for any system of rewards. CAMIS survey data of over 5000 buildings, comprising more than 73 million square feet of space, is used to inform and support capital planning and decision-making. Such a system would evaluate each agency’s ability to properly maintain assets, and direct incentive funding to those entities that have demonstrated a track record of responsible stewardship.

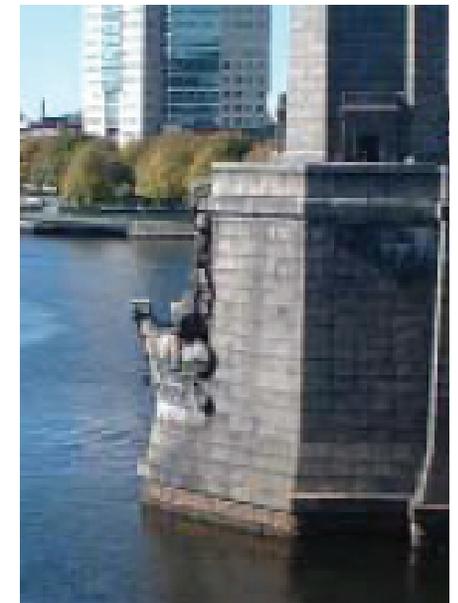
2. Explore Innovative Contracting

There is a robust public debate about the utility of different contractual forms to shift risk, cost, and control from the public sector onto the private sector. The traditional process for construction is a three-step process of design-bid-build, with a separate procurement process for each step. Several innovative methods (build-lease-transfer, design-build-operate, design-operate-own,

lease, concession, divestiture) combine multiple steps in the process.

Each method provides a potential advantage for the state, including access to financing, faster execution of projects, outsourcing of maintenance responsibility or greater accountability for construction quality. The inclusion of life-cycle costs and a plan for extended maintenance at the outset of a project, during the financing, design and construction stage, will insure that an adequate maintenance plan is in place and can be funded.

Along with these positive attributes, potential shortcomings should also be considered, such as a perceived or actual loss of control of assets. This section does not address that broader debate. It



is intended to examine how innovative contracting has the potential to embed life-cycle costs into every project, ensuring that adequate maintenance is planned and funded.

It should also be noted that current state law prevents the regular utilization of most of these techniques without special legislation. Most of these contracting methods would require the suspension or amendment of several state laws, including sections of the public construction laws and public works construction law.

3. Dedicate Statewide Oversight and Funding to Maintenance

In some states, the maintenance of facilities has become an integral and automatic part of state budgeting. This section provides an overview of how Missouri, Utah, Washington, and Virginia have addressed their facilities' maintenance problems. The State Infrastructure Bank program, created through federal legislation, has also shown promise. Massachusetts has explored similar approaches, as explained below, with uneven success.

Missouri

Missouri established a separate fund for maintenance in 1998. In the program's first fiscal year, one tenth of one percent (0.1 percent) of the general fund was deposited in the Facilities Maintenance Reserve Fund (FMRF). This percentage has increased by one tenth of one percent each year until the FMRF reaches 1

percent of the general fund in 2007. Thereafter, it will continue to receive 1 percent of the general fund every fiscal year.

By comparison, Massachusetts expects \$17.85 billion to flow into its General Fund in fiscal year 2008, therefore a fully funded contribution of 1 percent to a Facilities Maintenance Reserve Fund would be \$178.5 million, and the initial payment (at 0.1 percent) to phase in a fund would be \$17.85 million.

Missouri withdraws money from the fund on an as-needed basis. This requires each department to review the condition of facilities under their control and estimate the costs for repairs to maintain existing conditions or make needed upgrades.

Utah

The state of Utah has been working on the problem of deferred maintenance for almost 15 years. The first step was the creation of the Facilities Condition Analysis Program. The state contracted with ISES Corp of Atlanta, GA to do an initial condition assessment of all state facilities. Legislation was passed that established standards for evaluating condition and funding for capital improvements.

The statute defines "capital improvements" as any remodeling, alteration, replacement or repair project with a cost of less than \$1.5 million; a site or utility improvement with a total cost of less than \$1.5 million; or a new facility

with a total construction cost of less than \$250,000. "Capital developments" are defined as any remodeling, site, or utility projects with a total cost of \$1.5 million or more, new facility with a construction cost of \$250,000 or more; or purchase of real property where an appropriation is requested to fund the purchase.

The law prohibits the Legislature from funding design or construction of any new capital development projects until they have appropriated 1.1 percent of the replacement cost of existing state facilities to capital improvements. While such a binding restriction would most likely not pass the Massachusetts Legislature, it would serve as a useful tool to prioritize maintenance.

New construction accounts for about 8.5 percent of Utah's \$1.6B FY 2008 capital and debt service budget. Under the law, \$10,138,600 is set aside for capital improvements.

The capital improvement funds are administered by Division of Facilities and Construction Management. Agency projects are funded based on priorities from a Facility Condition Analysis database, maintained and upgraded each year by ISES Corp. There are four categories of projects: Plant Adaptation, Capital Renewal, Deferred Maintenance, and O&M. These projects are prioritized based on the urgency of the asset's needs: Immediate, Within one year, Two-to-five years, and Six-to-ten years.

Kent Beers, Utah Director of Capital Planning, notes that for new capital development projects, funding is a "free for all," but for capital improvement projects, the state now has a "condition planning tool." In discussions with legislators, he often equates this to the need to change the oil in your car. Better to do that, he says, than have to buy a new engine.

This affects not only their budget documents but also their financial reporting documents. The State's Comprehensive Annual Financial Report (CAFR) includes Required Supplementary Information on the infrastructure assets (roads and bridges) of the Utah Department of Transportation (UDOT).

For instance, in FY2005 Utah spent \$308 million to maintain state roads and \$54 million to maintain bridges. Presenting these figures in the CAFR is a critical component of the maintenance program, since it provides information on cost of maintenance to legislators, other elected officials, agency heads, non-profit organizations, business leaders, and the general public.

Washington

The state of Washington has embarked on a rigorous look at state maintenance practices.

The Washington State Department of Transportation (WSDOT) conducted customer (driver) surveys in 2000 and again in 2005. The results of the surveys

have helped WSDOT focus on those infrastructure components most in need of repair.

Both the 2000 survey and 2005 survey indicated that roadway surfaces had the most pressing need to be improved. Most of the respondents rated highway maintenance as average to above average. The surveys are part of a Maintenance Accountability Process (MAP) where in-house condition surveys assess the maintenance levels that exist at any given point in time. These surveys assess a broad range of metrics - pavement condition, function of drainage structures, condition of bridges, vegetation levels, etc. These assessments are collected quarterly in a report known as "The Gray Notebook," which presents the metrics in a simple format and also includes additional detail for expert study.

In addition, recently enacted legislation requires WSDOT to utilize a life-cycle cost model for all of its capital assets. All assets must be inspected and updated for asset condition at least every three years.

Virginia

The Commonwealth of Virginia has studied the issue of deferred maintenance for several years. In response to legislation passed by the General Assembly (Chap 4, Section C. 194.1 of the Special Session) the Virginia Auditor of Public Accounts (APA) issued an interim report in December 2004. That report contained a summary of state-owned buildings and compared

Virginia's Building Life Cycle with an Ideal Building Life Cycle. A final report was issued in December of 2005 indicating that 5,269 of Virginia's 10,449 buildings had a deferred maintenance backlog of \$1.626 billion.

State Infrastructure Banks

With the passage of ISTEA, the 1995 transportation funding authorization, the Federal Highway Administration encouraged formation of State Infrastructure Banks (SIB) to fund transportation projects. Originally limited to 10 pilot states, the program has proven highly successful. The states involved in the pilot program capitalized their banks with a combination of federal funds, state appropriations, and bond proceeds.

In concept, a SIB is similar to a revolving fund. Capitalized funds are placed in the bank and then loaned out to qualified borrowers. Payments made back to the bank in the form of capital and interest are then loaned out to new borrowers. In the latest 2005 federal transportation reauthorization act, called SAFETEA-LU, all states are eligible to establish an SIB and Massachusetts has legislation pending.

The SIB can also issue letters of security or loan guarantees to borrowers who wish to finance through private sources such as a bank or private trust. Borrowers can be public entities such as cities, towns or regional agencies, or private entities like railroads or private toll road builders. By providing such funds, significant leveraging of private investments

can occur. The pending legislation in Massachusetts proposes a Board of Trustees including the Secretary of Administration and Finance, the Secretary of Transportation, the State Treasurer, and a fourth member appointed by the Governor, possibly with the consent of the Senate.

Proposed projects must be approved by an advisory board, which may consist of the appointees of the Co-Chairmen of the Legislature's Joint Committee on Transportation and the Directors of the Metropolitan Planning Organizations.

States that have created an SIB have moved ahead of Massachusetts in providing for transportation infrastructure. In Arizona, the SIB was first capitalized in 1996 with \$6.7 million in federal funds. By 1998, the SIB was capitalized with \$25.1 million in federal funds and \$2.4 million in matching state monies. With interest earnings of \$2.2 million, the SIB account as of October 1998 was \$39.7 million. By 2006 the state had approved 53 loans for transportation/economic development projects at a value of \$582 million.

In Texas, the state legislature authorized the SIB in 1997. As of August 2000, the Texas SIB had disbursed \$39 million and made commitments of nearly \$26 million more. As of August 2000, the SIB had a cash balance of roughly \$197 million, of which \$171.5 million was not yet committed to projects. Today the Texas SIB has approved 67 loans,

totaling \$294.9 million, which have leveraged more than \$2.03 million.

With a focus on economic development and transportation needs, the proposed Massachusetts State Infrastructure Bank could provide significant leveraging power in helping cities and towns to solve the maintenance and replacement needs of aging transportation facilities.

This study chronicles many of the problems faced by Massachusetts in the area of asset maintenance. There has been some attempt to address these problems. In the mid-'90s, the Massachusetts House Ways & Means Committee began to explore options for increasing budgeting for maintenance. The initiative that resulted in the CAMIS database grew out of this period. A Capital Maintenance Reserve was created and funded with \$12 million for a single fiscal year, but was eliminated in the following fiscal year.

CONCLUSION

The Longfellow Bridge is in sad shape, in part because of age and weather conditions, but mostly due to our neglect of maintenance. It serves as a crucial artery for the city, carrying almost 50,000 vehicles per day plus 100,000 Red Line riders. Yet, it has only received two significant rehabilitation efforts in 100 years, totaling \$23.5 million in 2007 dollars.

The results of this neglect are troubling: massive deterioration of key structural components of the bridge, significant

cracking in the stone piers, and potential settling of the foundation. Fixing these problems is currently estimated to cost \$180 million to \$200 million, with the potential for huge cost escalation if additional problems are found.

The decay of the Longfellow is symptomatic of a problem that threatens most of the Commonwealth's assets. These assets suffer from a maintenance backlog in the tens of billions of dollars. We lack a centralized system to comprehensively manage our assets. Our financial reporting system lacks procedures for condition assessment of these assets. The responsibility for their maintenance is highly compartmentalized and responsibility for maintenance can be unclear. Most importantly, we either fail to budget for maintenance, or discourage upkeep by forcing state managers to fund maintenance out of annual operating budgets.

Furthermore, there is no statewide plan in place to stop the problem from growing worse. Every new structure that is built, every road that is paved, every new asset of the Commonwealth is currently doomed to decay for lack of maintenance.

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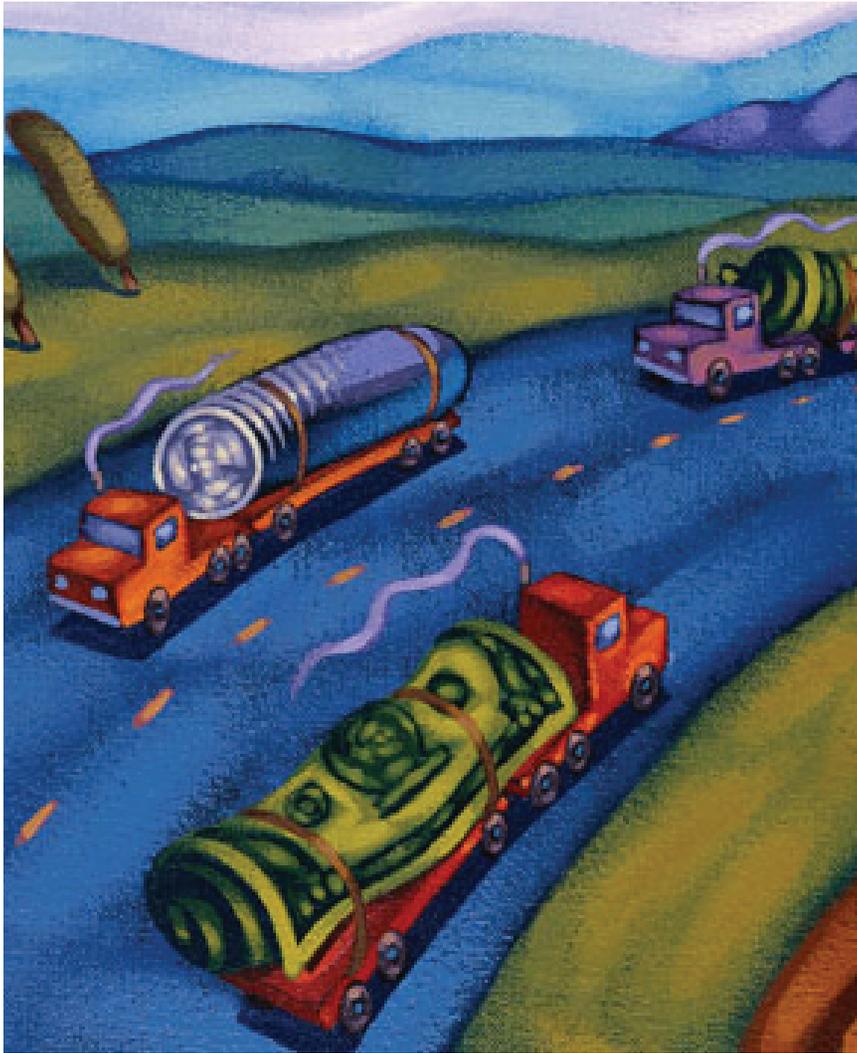
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Economic Growth Benefits of Transportation Infrastructure Investment

by John C. Taylor, Ph.D.

Senior Policy Analyst, Mackinac Center for Public Policy

Why do we raise taxes to invest in transportation? Because transportation investment boosts productivity and the wealth generating potential of the entire economy. It also increases personal mobility and quality of life. The key benefit, however, has nothing to do with “job creation” in the construction trades. In fact, we want to create as few jobs as possible in those sectors because we want to get as much road transportation mobility and reliability as possible for as little cost as possible in terms of investment and payroll for construction workers.

Nor is the key benefit related to personal income growth in a particular geographic area where the road is built. No, the key benefit and reason for transportation investment is from helping to make businesses and individuals more productive, across the geographic landscape. We rely on our transportation investments to increase the economy’s overall productivity – both in terms of making individual travel (business and personal) faster and more reliable, and in terms of the productivity benefits of making freight flows faster and more reliable. “Any congestion, or lack of

This article is excerpted from a larger report, “Road Funding: Time for a Change.” To view the full report, please visit: <http://www.mackinac.org/archives/2007/s2007-05.pdf>

capacity, must be viewed as a bottleneck not just to traffic, but to productivity and economic growth itself.”

Although private investment in transportation infrastructure is growing, transportation funding is still overwhelmingly public. So when one asks if investment in transportation crowds out more productive private investments, one is essentially asking if public investment in transportation crowds out more productive private investments. Some research suggests the answer is no. According to economist David Aschauer, publicly funded roads increase the profitability of private investment (higher rates of return) and lead to increases in private investment with the expected economic growth benefits. Aschauer has suggested that every one percent increase in highway infrastructure investment will increase GNP by as much as 0.24 percent.

While the level of return is hard to estimate, the Congressional Budget Office in 1991 asserted “cost benefit analysis finds substantial returns to increases in federal funding for highways.” Further support for the benefits of highway investment came in the testimony of OMB Director Richard Darman who said, “it is apparent that some public investment – particularly

Every one percent increase in highway infrastructure investment will increase GNP by as much as 0.24 percent.

for street and highway infrastructure provides direct productive services that are complementary with private investment.”

But how does investment in transportation lead to benefits that are worth more than the negatives from crowding out other investments? The rest of this section attempts to explain this benefit, along with other benefits to personal travel and quality of life that also result from highway investment.

THE BROAD RATIONALE FOR TRANSPORTATION INFRASTRUCTURE INVESTMENT

In the business manufacturing and services sectors the investment in roads helps make transportation costs/mile lower. That helps economic development because it allows for increased manufacturing and services specialization, and the productivity benefits that come as a result. It does this by making both domestic and international “trade” in goods and services between specialist firms cheaper. “Trade” is cheaper when the transportation costs are lower, thereby allowing specialists to obtain specialized inputs of physical and services components from even far away sources. Trade also lets them sell their specialized production and/or services at great distances thereby increasing their market area.

Even though specialist producers make very narrow focused lines of goods

and services, they can develop large enough volumes to achieve economies of scale by being able to sell at great distances from home. They can also sell to far away markets because of the low transportation costs and speed/reliability of transportation times. So the specialist is able to focus on the narrowest of product lines and/or services and generate large gains in productivity. That specialist can also sell that specialized good or service worldwide with transportation costs of trade that are low and do not eat up the production productivity benefits that came from specialization. This helps maximize economic growth and wealth because specialization and the resulting productivity growth is the key to creating wealth.

In the business manufacturing and services sector, the investment in roads helps lower transportation costs per mile. That allows for increased manufacturing and services specialization and the productivity benefits that come as a result.

From a freight perspective, trading specialized production back and forth domestically and internationally, with as little cost as possible, is about more than simply lowering transportation costs. Manufacturers trying to reduce the cost of their “trade” interactions strive to lower their overall supply chain logistics costs relating to everything from the



costs of distribution center warehouses, to the costs of carrying inventory, to the costs of transportation.

The goal is to lower the total cost of trade logistics. From a supply chain logistics standpoint, lower transportation costs and improved transportation reliability, that results from transportation investments, allow manufacturers to substitute transportation for more expensive distribution centers and the inventory they hold. We don't need inventory stacked up in multiple warehouses near every customer if we can rely on good transportation to quickly deliver what customers order in a fast and reliable way from a far away production site. By making these substitutions of transportation for warehousing/inventory costs, manufacturers have found that they can often lower total logistics costs because the costs of warehousing and inventory go down by more than the extra aggregate transportation costs. This is true so long as we can get lots of good transportation (fast and reliable) at low unit transportation costs.

These principles have allowed U.S. companies to implement just-in-time (JIT) production and distribution techniques that lower the overall costs of trade and logistics domestically as well as internationally. At the same time these principles are allowing for transportation speed and reliability to increase responsiveness to changes in global demand. Because transportation costs less after proper transportation infrastructure investment companies

Firms faced with reduced congestion throughout a network can improve the reliability of delivery schedules and eliminate distribution centers, clustering fewer depots around key centralized points in the improved transportation network.

can actually afford to buy more of it. So their transportation inputs and costs may actually go up because they can afford to use more of it, and they substitute that transportation for previous use of distribution centers and inventory. This allows them to lower their total costs of logistics. But the key is reliable transportation systems and that takes investment in all modes of transportation, but especially highway transportation. Highways are key because trucking is the only mode that can offer the speed, reliability and low cost of unit transportation that is critical to the above supply chain logistics equation.

“Given the above points, in considering the return from transportation infrastructure investment, it is insufficient to simply estimate the savings in vehicle operating costs and the value of time savings as the principal investment benefits.” Instead, it is important to consider the impact that major network improvements can have in allowing firms to substantially restructure their logistics and distribution networks. “Firms faced with reduced congestion throughout a network can improve the reliability of delivery schedules so that smaller and more frequent deliveries are made. This

in turn allows for a reduction in inventory. Firms may also eliminate distribution centers, clustering fewer depots around key centralized points in the improved transportation network.” Failure to account for these network economies can lead to a substantial understatement of the positive impacts of transportation infrastructure investment on productivity and economic growth. Coupled with the benefits of facilitating trade at lower costs, and therefore increasing specialization with resulting productivity gains, transportation investments can have major impacts on economic growth if they are targeted in a way that will maximize business benefits.

In the individual auto travel sector, transportation infrastructure investment helps personal mobility, and therefore quality of life and business productivity. It is critical in today's service oriented economy that business specialists be able to travel wide distances to ply their specialized crafts. If they are limited to a narrow geographic area because it is too time consuming to travel greater distances then they will have to offer a broader less specialized range of services in their narrow geographic area in order to achieve the same level of sales. The result will be that they cannot specialize to the same degree, and they will not be able to offer the same level of benefits to customers because they have to be generalists.

Think about specialization in services. Technicians are traveling all the time — whether they are servicing robots in

In deciding where to locate their businesses, companies consider where their potential workers will have the most travel mobility.

manufacturing plants, servicing personal computers or providing technical support to farmers. Also think about consultants that travel back and forth to clients. The number of individual specialist categories that drive our economy are stunning, and the number of specialists and the degree of their niche specialization is growing at a fast rate. Another category of business traveler critical to the economy and to individual businesses is salespeople, who are often highly specialized consultants/salespeople for highly technical services and goods companies. Consider such expeditors and courier delivery services as UPS and Fed Ex. Or consider even more specialized same-day delivery services that often use autos and pickup trucks to deliver small quantities on a daily basis all over the world. All this requires superior transportation speed and reliability. All these specialists require fast and reliable highway and other transportation infrastructure to facilitate their activities.

In the individual auto travel sector, infrastructure investment helps personal mobility, and therefore quality of life and business productivity.

The companies that employ these specialists are looking for regions where they can locate in which there is ready



from greater distances. Companies also favor locating in areas where their workers will be happiest so they can draw more of the best-qualified specialists. Workers and their families need to have access to good mobility without congestion, unsafe roads, and poor road conditions. It takes transportation infrastructure investment and maintenance to make this happen.

NATIONAL TRANSPORTATION INVESTMENT AND ECONOMIC GROWTH

The linkage between transportation investment and economic development is quite strong. The underlying macroeconomic rationale is clear, and individual companies understand the benefits of good transportation as noted below in several case studies. That is why many government and industry leaders are pointing out the need for a renewed focus on addressing a crisis in transportation infrastructure. We simply are not keeping up as a nation, from either a marine, air travel or highway standpoint. That is why national political and business organization leaders are saying it is time to come up with a solution to transportation investment problems.

For instance, while not calling for a federal tax increase, former Secretary of Transportation Norm Mineta said in July 2006 that America is losing \$200 billion per year, or \$900 per adult, due to freight bottlenecks. Mineta adds that consumers are losing 3.7 billion hours and 2.3 billion gallons of fuel per year

access to the kind of transportation services that make it possible for their suppliers' service/sales technicians to call on them quickly and reliably; and that in turn allows their own service worker technicians, salespeople/technicians, and courier services to call on their customers in a similar way. And, of course, these companies want access to as wide a pool of specialist and other labor talent as possible. In deciding where to locate their businesses, they in part consider where their potential workers will have the most travel mobility. The greater the travel mobility, the greater the pool of potential talent that is available to them because workers can effectively commute

sitting in traffic jams. These are major economic losses that transportation investment can help eliminate.

Another leader who has addressed the infrastructure funding question is former Michigan Governor, and current President of the National Association of Manufacturers, John Engler. Governor Engler understands the potential economic benefit of transportation infrastructure investment. He was recently quoted as saying he was:

part of raising the fuel tax in Michigan (in 1997), and not once did I have to be apologetic about it or on the defensive, because the state's economic analysis demonstrated the improvements paid for by the tax increases were a good investment for Michigan.

Nationally, a number of business organizations have tried to point out the relationship between the transportation system and economic development.

NATIONAL CASE STUDIES ON HIGHWAY INFRASTRUCTURE INVESTMENT BENEFITS

At a macro level, it has been possible to measure how the costs of logistics have fallen for companies over time. For instance, between 1980 and 2002, the costs of logistics in the United States dropped from 16 percent to just 9 percent. While these reductions are due to many factors, such as telecommunications technology and transportation economic deregulation,

they are also due to improvements in transportation infrastructure. Following are several examples of how companies are positively or negatively affected by the level of transportation infrastructure available to them. Some have used superior transportation systems to remodel their supply chain logistics in a way that boosts productivity. Others have relied on quality transportation to help draw skilled employees to their area, and actively seek to locate facilities where such transportation infrastructure exists.

Dell is a great example of how companies have been able to restructure their production and supply chain systems because of the availability of superior transportation infrastructure and institutions. By using just-in-time deliveries, that would only be feasible with fast, reliable and relatively low-cost transportation, Dell has been able to centralize production in specialized plants. They have also been able to eliminate market area warehouses, cut inventory from 85 days supply to just 6.6 days, and provide a customized "make to order" product for their customers, with reasonable cost, next day delivery anywhere in the world. Such a response-based system would not be possible without access to quality transportation networks.

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On the production/distribution side, HP has been able to reduce order cycle times and reduce inventories by making more frequent shipments in small quantities.

Another example is Campbell Soup Company. “Campbell improved performance throughout its supply chain and reduced overall production costs using a good system of highways to achieve reliable transportation. This allows them to adopt just-in-time deliveries and strategic alliances with suppliers. The greater reliability and reduced transport time achieved with truck transportation have allowed Campbell’s plants to reduce inventory and handling costs.”

Hewlett-Packard (HP) has also been able to improve its production and supply chain logistics because of superior transportation infrastructure, but employee mobility and quality of life are also key considerations for them. On the production/distribution side, HP has been able to reduce order cycle times and reduce inventories by making more frequent shipments in small quantities. A good highway system and access to airports are key to implementing that strategy. HP also is in part able to attract and retain highly skilled, innovative employees by locating its facilities in areas where the highway network provides good labor access for short and long distance commuting.

The Limited brand retail chain provides

another example of the value of good highways. They are able to stay in-stock with the latest fashions and cost efficiently distribute to a network of 4,425 stores in 48 states from a centralized distribution point in Columbus, Ohio, by having access to the interstate highway system. The reliability and short transport time achieved by long distance trucking over the nation’s highway system allows frequent and reliable restocking of even the most remote locations from one centralized distribution point. By centralizing inventory, the Limited is able to reduce warehouse and inventory costs in a way that maximizes service and actually lowers total logistics costs even though they pay more for freight.

General Motors, and other U.S. and foreign auto companies, also rely on the highway system to tie them to their network of suppliers around the world and around the country. Their integrated manufacturing processes depend on just-in-time delivery of production components from thousands of suppliers. The speed and reliability of truck transportation that is possible over a good highway network facilitates the receipt of more frequent, smaller shipments just-in-time, thereby allowing for far lower inventory levels of components.

Smaller companies also rely on congestion-free highways. Bueno Foods, a New Mexico producer of chilies, sauces, and salsas, says any type of congestion causes it serious problems in that it delivers to customers great distances away on both coasts. Bueno says congestion imposes costs on the supply chain, but



that those costs are hard to see. That is especially true for smaller companies that don’t have the resources or options of the bigger companies.

Finally, for Xerox Corporation, a good highway system provides essential support for on-time delivery of components to manufacturing facilities in even remote locations. The efficiency and reliability of truck transportation over the interstate system also makes it possible to ship finished products to customers all over the country. This can be done in a timely way despite long distances, and without the need for large inventories in market area warehouses.

On the other hand, when adequate transportation is not available, it is interesting to see what kinds of impacts there are. When the transportation system cannot guarantee speed and

reliability over large distances, shippers change logistics strategies by adding distribution centers and filling them with more inventory — all at great cost. While the biggest problems are currently in ports, airports and rail yards; highways are also a problem, especially in urban areas.

Wal-Mart’s experience with their private fleets in urban areas further clarifies the costs of poor transportation systems and resulting congestion. Wal-Mart averages 21.3 percent fewer miles per tractor per week in urban areas than in rural markets. This would seem to be a good indicator of the impact of congestion. As a result, Wal-Mart needs more tractors, consumes more fuel and generates more pollution than would otherwise be the case. And of course it is consumers that in the end pay the higher costs.

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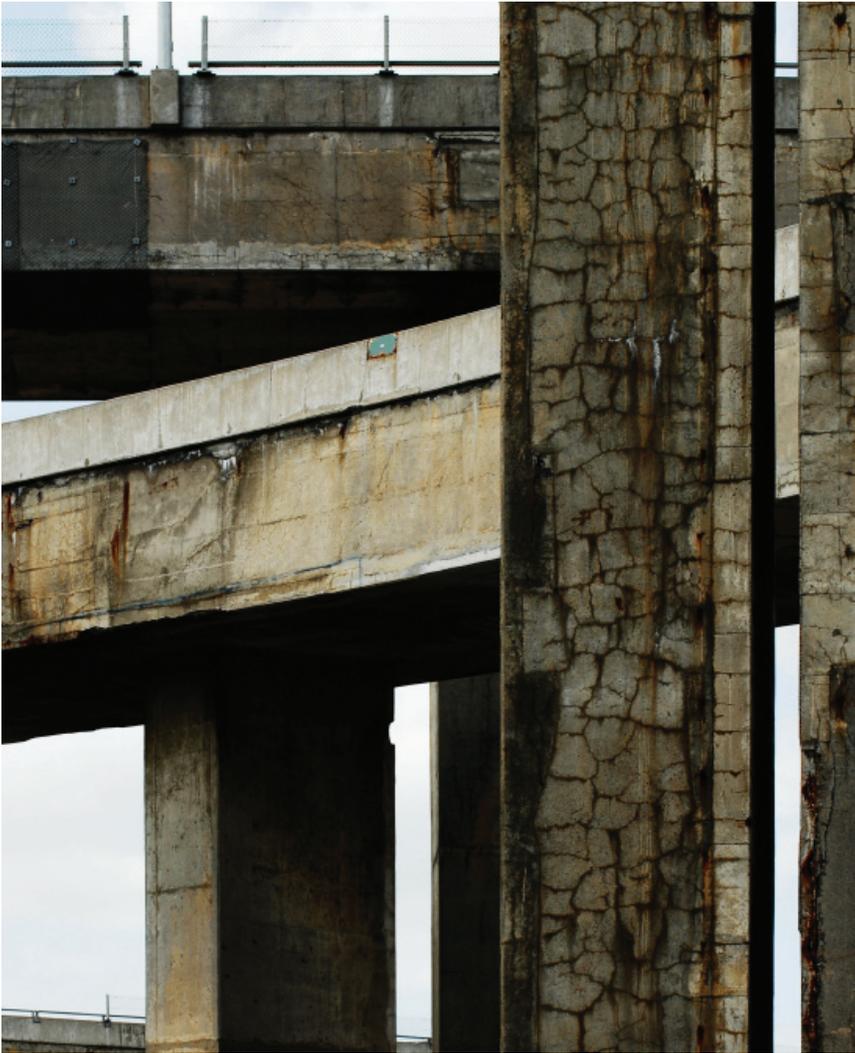
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Raising Gas Taxes Won't Fix Our Bridges

By Adrian T. Moore, Ph.D.
Vice President of Research, Reason Foundation

The I-35 bridge collapse in Minneapolis has revealed the ugly truth about our tendency to put off the maintenance of infrastructure. Indeed, the American Society of Civil Engineers estimates that our basic infrastructure needs an infusion of at least \$1.5 trillion just to bring it into “good” condition.

Not surprisingly, many are calling for more funding to maintain our public infrastructure, including many proposals to infuse immediate cash into repairing bridges. Raising the federal and state gas taxes is one of the leading proposals.

Unfortunately, our infrastructure needs more than stop-gap financing. We need to ask the following questions first:

1. How did we get here?
2. Will a temporary boost in funding fix the problem?
3. What is the right way to deal with a funding crisis?

HOW THE PROBLEM AROSE

We don't invest enough in our core infrastructure. In a nutshell, that's why bridges like the one in Minneapolis are falling down. Building new infrastructure is expensive, complicated, takes a long time, and is often controversial.

Compounding this problem is the political nature of infrastructure funding. The ebb and flow of politics determines who and what gets funding and when. Without a

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lobbyist in Congress, infrastructure like roads and bridges often take a back seat. It's all too easy to put off maintenance until next year so that you can spend the money elsewhere this year.

Now the deferred maintenance bill is a \$300 million annual deficit for roads, bridges, tunnels, and other infrastructure.

A TEMPORARY BOOST IN FUNDING WON'T FIX THE PROBLEM

Bridges are just the tip of the iceberg. The transportation funding system has a bias toward underfunding infrastructure and letting maintenance lag. A temporary infusion of cash into bridges is just a feel-good measure. The average household in the United States pays about \$214 in federal gas taxes and between \$99 and \$374 in state gas taxes (depending on their state) each year. Adding to that burden to throw more money into a bad funding system won't help.

The funding system has a bias toward underfunding infrastructure and letting maintenance lag.

If we want to avoid future disasters and the other risks associated with poor infrastructure we need to change the incentives in the system. Our system of funding infrastructure rewards deferred maintenance, not proactive management. States and localities that underinvest in maintenance still get their appropriation

Our system of funding rewards deferred maintenance, not proactive management.

of gas tax revenues the each year, regardless of their decision to allow the system to deteriorate.

Proposals for a temporary federal gas tax hike to fund bridge repairs would be a worst case scenario of rewarding bad behavior. Residents of states that have done a good job maintaining bridges would pay the higher gas tax, but their state would get little, if any, of the funds. Instead, the funds would go to those states that have poor bridges, i.e. those states that have shown they do a lousy job with their maintenance budgets. We would be rewarding failure and punishing success. Until Congress and state legislators base funding on results and refuse to throw good money after bad, this problem will continue.

WHAT IS THE RIGHT WAY TO DEAL WITH A FUNDING CRISIS?

A sensible approach to America's transportation funding crisis, just like when dealing with the family budget, is to first look at managing your spending, then see what you can do about income. This is a three step process.

First, what are you doing with the money now? In the last transportation bill, individual Congressmen and Senators carved out special funding for

6,373 pet projects amounting to over \$24,215,018,641. These "earmarks" are not subject to cost-benefit analysis or any form of prioritization other than the political strength of politicians on Capitol Hill.

A sensible approach to America's transportation funding crisis, just like when dealing with the family budget, is to first look at managing your spending, then see what you can do about income.

In Minneapolis, state legislators spent a great deal of the past two years working on a special tax to pay for a new stadium for the Minnesota Twins. They did not spend that much time debating how to pay to fix deficient bridges.

Clearly, in the wake of the I-35 bridge collapse, Congress and state legislators need to re-examine transportation priorities and base funding on objective needs, not politics.

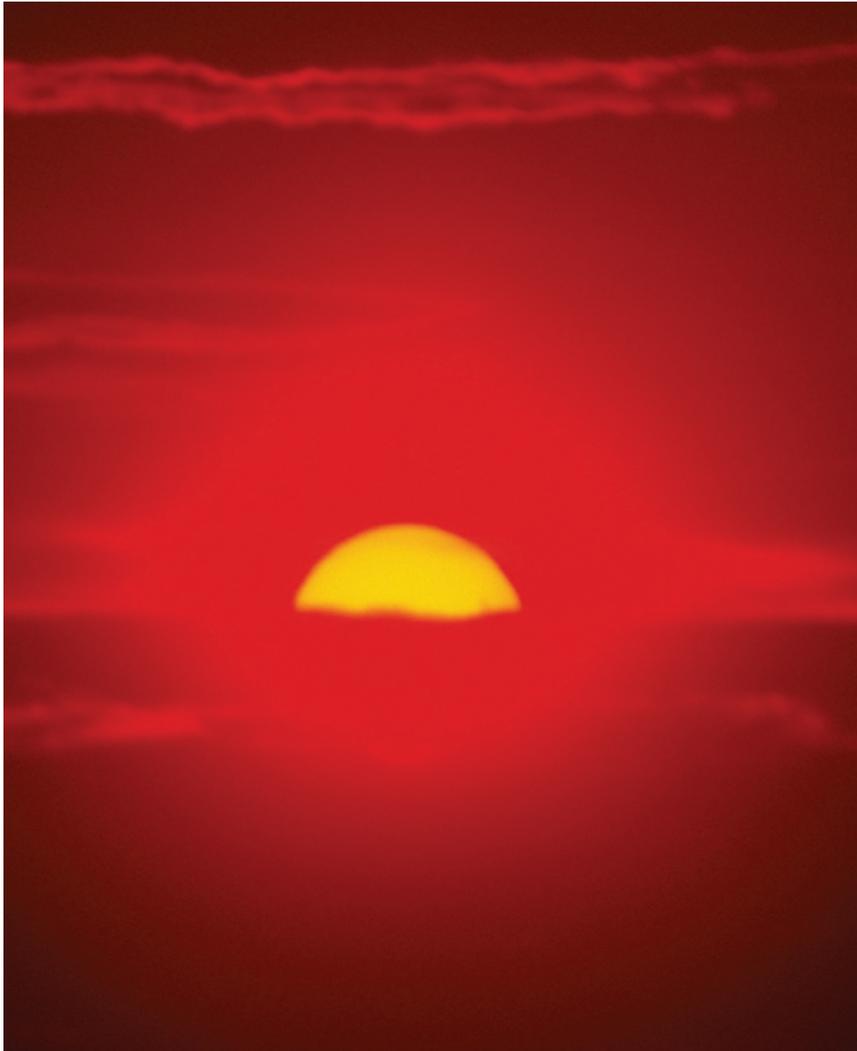
Second, are we getting the most bang for the bucks we already spend? Some states do a better job than others at providing infrastructure. For example, a comparison of state road conditions shows that some states do a much better job with road maintenance money than do others. Missouri is working on a landmark public-private partnership to have all 800 bridges in the state brought up to snuff in the next five years. Several other states have used public-private partnerships to get more maintenance

Too often we say the problem is a lack of funding and the way we do things is fine, when we should be constantly seeking to change and improve how we maintain our transportation systems.

out of the same budget. Too often we say the problem is a lack of funding and the way we do things is fine, when we should be constantly seeking to change and improve how we maintain our transportation systems.

Third, and only third, address additional revenue. At the federal level, Congress has created two commissions to create recommendations for how to fund transportation in the future. We should invest now in the first and second steps and wait for those recommendations before hastily increasing the gas tax.

Dr. Adrian Moore is vice president of research at Reason Foundation, a non-profit think tank advancing free minds and free markets. Moore oversees all of Reason's policy research and conducts his own research on topics such as privatization, government and regulatory reform, air quality, transportation and urban growth, prisons and utilities.



ON THE HORIZON

In 2005, Congress indicated its intent to address the future of the federal surface transportation program within the SAFETEA-LU transportation bill. Congress chartered two commissions – the 12-member National Surface Transportation Policy and Revenue Study Commission (“Policy Commission”) and the 15-member National Surface Transportation Infrastructure Financing Commission (the “Financing Commission”).

BACKGROUND

In Section 1909 of SAFETEA-LU, Congress established the Policy Commission (also known as the “1909 Commission”), which just released its final report on January 15, 2008.

Just as vital but not as well-known, Section 11142 of SAFETEA-LU

established the Financing Commission and charged it with analyzing future highway and transit needs, the finances of the Highway Trust Fund, and alternative approaches to finance surface transportation infrastructure. The members of the Financing Commission have broad experience in finance, government, industry, law and public policy. The body is subject to the Federal Advisory Committee Act and all of its meetings are open to the public.

Although Congress directed both groups to assess the long-range future of the Highway Trust Fund and to consider alternatives to the motor fuels tax, it was the Financing Commission that was also specifically tasked to study whether states could opt out of the federal aid program. The Commission’s interim report, *The Path Forward: Funding and Financing Our Surface Transportation System* was released in February 2008.

Over the next year, the Financing Commission will craft specific recommendations for funding and financing the future federal role based on the work of the Policy Commission and other industry professionals.

INTERIM REPORT

In February, the Financing Commission's interim report included its assessment of the problem before Congress, how it will evaluate potential revenue sources, and how it will arrive at recommendations about future transportation funding. The report is meant to serve as a catalyst to generate greater debate and stimulate feedback.

The Commission made the following observations:

1. Transportation system demands are outpacing required investment;
2. The costs of maintenance costs compete with necessary expansion of the system;
3. The motor fuels tax, the principal federal funding source, is insufficient at current rates;
4. Pursue more direct user charges; and
5. Greater and more intelligent investment is needed along with better operation of the system.

According to the Commission, our national transportation system requires a substantial of revenue to maintain and improve our highways, transit systems,



and intermodal connectors necessary to keep pace with economic and population growth. The Commission characterized the current system as in a state of "physical and financial crisis" due to insufficient funding.

The group concluded that relying principally on the federal fuel tax "may not be a sustainable strategy in the long run" because as fuel economy continues to rise, "the fuel taxes that are the backbone of the federal transportation revenues will continue to shrink relative to use and needs of the system."

The report further found that the combination of inadequate fuel tax revenues and the high maintenance costs force state and local governments to delay needed capacity enhancements. The report noted that "if we are to remain competitive in a global economy, we must thoroughly reassess the current approach to funding surface transportation infrastructure."

In contrast to 1909 Commission who called for a 40 cent gas tax increase, the Financing Commission recommended a complete change in how transportation infrastructure is funded. Instead of a gas tax hike, the Financing Commission opted to explore ways to generate revenue by linking users more directly with their impact on the transportation system.

The group concluded that it will examine various existing and potential funding mechanisms, including direct user charges, and other financing options to augment current revenues and encourage more efficient use of system capacity.

Its final report is due by late 2008 or early 2009 in time for the congressional reauthorization process.

FULL INTERIM REPORT

The full interim report of the National Surface Transportation Infrastructure Financing Commission is available online at <http://financecommission.dot.gov>.



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