



CELEBRATING THE INTERSTATE'S 50TH ANNIVERSARY

# THE EXCEPTIONAL INTERSTATE HIGHWAY SYSTEM

## *Will a Compelling New Vision Emerge?*

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**A**merica's Interstate Highway System is the envy of the world. China, India, and the European Union are working to produce comparable systems. Yet the Interstate system is exceptional in American history—so exceptional that it is almost un-American.

What is exceptional is the degree to which the federal government dominated the planning and financing of the Interstate. The federal government has played a role in the development of most of the nation's major infrastructure systems, but its role in the development of the Interstate system was extensive, including planning, financing, organizational structure, and research and development.

### Federal Involvement

The development of the U.S. primary highway network began in 1921, when the Bureau of Public Roads<sup>1</sup> provided a 50 percent match of funds for

<sup>1</sup> Now the Federal Highway Administration.

highways on the federal-aid system. Federal agents strictly controlled the designation of federal-aid highways, working in partnership with the states.

A formula that included land area and population was used to allocate financing. States would receive federal funds only as a reimbursement for completed work that had been inspected and approved by a federal official.

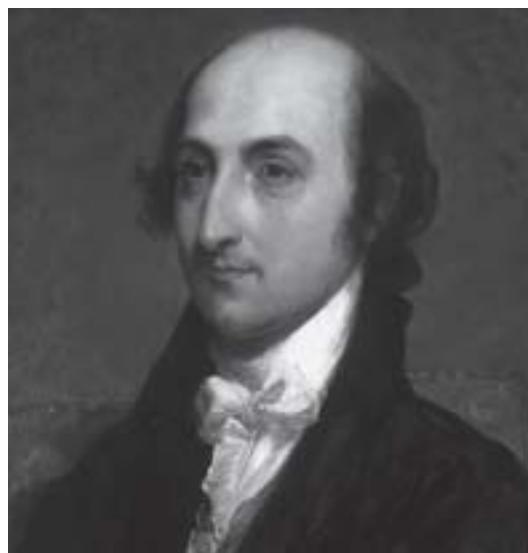
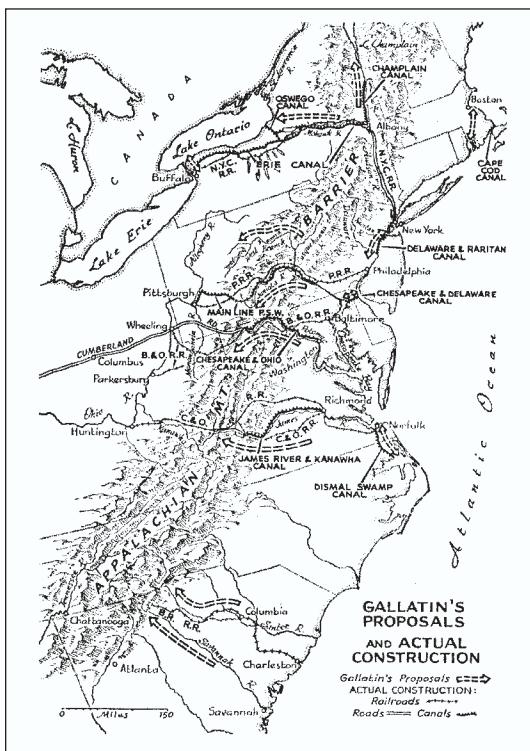
The development of the Interstate expanded the role of the federal government. The expansion started with the federal plans of the 1930s and the creation of the Highway Trust Fund in 1956, which provided 90 percent financing for the construction of Interstate highways.

The Interstate system was delineated through a highly centralized process of negotiation with each state, subject to a fixed, legislated cap on total mileage. Uniform design standards applied systemwide. Again, federal funds were available only on a reimbursement basis. Relatively uniform planning



Photo by Cal Briggs, Utah DOT

Construction of I-80 in Utah.



Albert Gallatin (above), Secretary of the Treasury under President Thomas Jefferson, developed the first plan for a national network of roads and canals, shown in the map at left. (Map is from Goodrich, C. *Government Promotion of American Canals and Railroads, 1800–1890*. Columbia University Press, New York, 1960.)

procedures were adopted—the four-step model—and national legislation for environmental assessment was added when that concern came to the fore.

### Contrasting Models

Few of the nation's major infrastructure systems have had such a strong, centrally planned path of development. Air navigational aids and the later air traffic control system had a strong federal presence beginning in the 1920s, although Pan Am and United Airlines played important roles early on. Intercity passenger rail has had a dominant federal presence since the establishment of Amtrak in 1971, and a strong federal regulatory presence before that. Agricultural water reclamation in the western United States had strong involvement by the U.S. Bureau of Reclamation and later by the U.S. Army Corps of Engineers.

The nation's other major systems—railroads, electric power, telecommunications, water supply, and water treatment—were the product of much more bottom-up development trajectories, with a much less central role for the federal government.

### Historic Roots

Reliance on bottom-up system development was not accidental. The founding fathers engaged in intense debates over what they called “internal improvements.” The early Federalists, led by Alexander Hamilton, argued that although the Con-

stitution gave the federal government no explicit authority to make internal improvements, that power was implied.

Thomas Jefferson's Republican party, concerned about giving too much power to the federal government, took a dim view of that interpretation. Initially, the Republicans opposed the use of federal power to make internal improvements such as roads and canals. Yet when they gained the presidency in 1801, the Republicans became much more comfortable with the idea of federal authority.

Jefferson's Secretary of the Treasury, Albert Gallatin, developed the first systematic proposal for a national network of roads and canals, which he submitted to Congress in 1808 (1). Gallatin's plan may be called the first plan for a national highway and canal system (see map, this page).



The National Road was the second U.S. road to use the McAdam principle of compacting broken pieces of rock that weighed less than 6 ounces and were smaller than a 2-inch ring; the process took 5 years to pave 73 miles by 1830. (Detail from painting by Carl Rakeman, courtesy of FHWA.)



Gallatin's plan was never realized, and federal support for internal improvements never materialized, with a few exceptions like the National Road—approximately today's U.S. 40—the Chesapeake and Delaware Canal, and the breakwater in Lewes, Delaware. Centrally planned systems of internal improvements did not reemerge until the early 20th century highway program.

#### American Federalism

Although most U.S. infrastructure systems developed from the bottom up, the national government still played an important role. For example, the federal government provided enormous subsidies for the development of the railroad system in the 19th century, giving away 131 million acres of land as an incentive to build out the network (2). But this is not the same as centrally planning a whole system.

Similarly, the federal government allowed AT&T's monopoly over telephone service for much of the 20th century, yielding a system that was centrally planned and developed. But again, this is not the same as the federal government planning a whole system.

The highway program also developed in the context of American federalism, with significant deference to states' rights and responsibilities. Federal-aid highways are owned and operated by states. Federal financial aid was for capital costs only, restricted orig-

inally to initial construction and later expanded to include reconstruction and rehabilitation. States then and now have the option to forgo federal funds and escape many federal regulations governing highway planning, construction, and operation—although none do.

#### The Interstate as an Exception

Many have come to view the dominant federal role in the Interstate system as normal, because it was the norm for the past half century. Yet compared with its role in other major systems in the nation's history, the federal role in the Interstate system is exceptional.

The Interstate is exceptional in another way. The program commanded widespread support from Congress and the states for almost four decades, from 1956 to the early 1990s. The total cost of the system in 2001 dollars is \$418 billion. During that time, the Interstate program was subject to almost no earmarking of projects. No other federal capital program survived as long without becoming the target of legislative earmarking.

#### Eroding Consensus

This exceptional period, however, appears to be drawing to a close. The recent reauthorization bill, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, contained

## China's Central Planners and the History of the Interstate

In 1996, a delegation from the State Planning Commission of the People's Republic of China visited Stanford University in California for a course on the development of market economies. The approximately 20 participants represented a variety of areas within the commission, with expertise in finance, economics, planning, and engineering.

The Chinese economy at the time was emerging from decades of a powerful central planning approach to governance. The Stanford program included lectures on the development of two of America's major infrastructure systems, the electric power system and the Interstate Highway System.

Chauncey Starr, the founder of the Electric Power Research Institute, lectured first on the development of the U.S. electric power system. Asked afterwards about the lecture, he commented, "They just didn't get it. All morning they kept asking, 'Where was the plan? Where was the plan?' 'There was no plan,' I told them. 'The system developed from the bottom up. Only later did it grow into today's integrated national system.' But they wouldn't accept that there wasn't a plan."

The next lecture on the development of the Interstate sys-

tem met with a different response. The lecture described the development of the primary highway system beginning in the 1920s, when the Bureau of Public Roads provided a 50 percent match of funds for highways on the federal-aid system. The delegates' questions immediately turned to the concerns of central planners: "How was the mileage allocated among the states?" "How was financing allocated?" "What controls were in place over design and construction?"

The lecture next described the development of the Interstate, starting with the plans of the 1930s and the creation of the Highway Trust Fund in 1956, which provided 90 percent of the financing for the construction of Interstate highways. Again, their questions focused on the concerns of central planners: "How were mileage and funds allocated?" "How were design and construction monitored and controlled?" "How were location decisions made?"

What was the difference between the electric power system and the Interstate system? One was centrally planned, and the other was not. To the delegates of the world's then-largest planned economy, that distinction made all the difference.

—Jonathan Gifford



more than 6,000 earmarked projects. Congress is no longer deferring to the judgment and guidance of the engineers and experts who designed and built the Interstate system. The exceptional consensus vision that brought the Interstate into being is eroding, and this erosion places the transportation system at risk.

The needs of the system are huge. The population served by the surface transportation system is growing rapidly. Traffic growth is likely to continue with economic and population growth. Traffic congestion plagues most American cities. The Interstate system is reaching its design life in most places and requires expensive reconstruction and renewal.

The system's capacity to meet those needs is sharply limited. Public support for expanding the highway system to accommodate new demand seems to be tepid at best, if not hostile.

There is no apparent appetite to raise the federal gas tax, even though the gas tax as a source of funding is being eroded by inflation. Alternative fuels not subject to the gas tax are already in use. Earmarked projects are taking an increased share of funds, and little help can be expected from a federal budget that is in danger of being absorbed by retirement and medical entitlements.

In short, the state of normalcy to which the transportation community has become accustomed for the past half century is ending. The challenge to today's generation of transportation leaders is how to follow the Interstate's extraordinary opening act.

## New Visions

Several possible new visions for the highway system are being discussed:

- ◆ **Connecting the United States to the world economy.** The American Association of State Highway and Transportation Officials and others have begun to highlight the highway system's role in connecting the United States to the world economy. This vision has freight as one of its central themes, as well as the increases in freight traffic that will arise from expansion in global trade.

- ◆ **Privatization.** Another possible vision, supported by the Reason Foundation, a public policy research group in Los Angeles, and others, is to expand dramatically the role of the private sector in financing system renewal, expansion, and operation. Approaches to such expansion range from traditional toll road financing to long-term concessions, such as Chicago's recent lease of the Chicago Skyway for \$1.8 billion. These approaches might move American highway system development closer to the approaches traditionally pursued in France and elsewhere in Europe.

- ◆ **National investment corporation.** Felix Rohatyn, a former Lazard Frères investment banker, and Warren Rudman, a former U.S. senator, have advanced one variant of a privately financed system. They propose a national investment corporation that would issue 50-year government-guaranteed bonds to fund improvements in highways, transit, high-speed rail, and airports, as well as schools and other infrastructure (3).

The idea is not completely novel—the Clay Commission appointed by President Dwight D. Eisenhower to help resolve disputes about paying for the original Interstate program also had proposed bond financing through a national corporation. Similar ideas had been advanced during the Depression. Both times the proposal proved politically unpalatable.

Yet some have criticized the national investment corporation proposal as "central planning writ large." The critics warn that toll road revenues could be applied to wasteful but politically correct projects (4).

- ◆ **Vehicle infrastructure integration.** The intelligent transportation systems community is advancing vehicle infrastructure integration (VII) as another vision. VII would enable vehicles to communicate directly with a detector-rich infrastructure network to allow automatic crash avoidance, road departure warnings, and delivery of other safety and consumer services.

The VII concept entails a network of 200,000 roadside installations—roughly one for every significant traffic signal in the nation. These installations would communicate with transponders in vehicles, and transponder-equipped vehicles would communicate with each other. The institutional and financial arrangements for the system are yet to be worked out.

- ◆ **Operations.** Also proposed is a national operations-oriented vision along the lines of "traveling coast to coast with no unexpected delay." Any delay

The lease of the Chicago Skyway may provide a model for financing system renewal, expansion, and operation through the private sector.



The original Interstate construction required durable materials (above). The next phase also may call for a "wired" system equipped with high-tech intelligent transportation devices.

on the system would be detected and communicated to travelers in advance. This vision could have the compelling simplicity and appeal of the Interstate system's original promise of coast-to-coast travel without a traffic signal.

◆ **Environmental harmony.** Environmental interest groups have not yet coalesced around a vision for the future of the highway system, although the concept of "smart growth" has received considerable attention. A system vision that is environmentally focused would include bike- and pedestrian-friendly communities, development that is clustered to ease service by public transit, and tolls and incentives to discourage driving alone, minimizing the need for additional highway capacity.

Some in the public health community, concerned about obesity and sedentary lifestyles, favor land use-transportation arrangements that support active lifestyles. Many others, however, question the links

between obesity, transportation, and land use.

◆ **Expanded rail.** Rail figures prominently in some plans. On the freight side, some would like to shift as much traffic as possible to rail, with containers and trailers on flat cars, at least for the long-haul portion of a movement. Railroad companies have seen this as a potential business opportunity for some time, and European countries have invested heavily in this strategy. Success stories are difficult to find, although freight increasingly moves via containers.

On the passenger side, high-speed rail has been a focus. Advocates envision a network of services that would capture a significant share in intercity markets up to 500 miles apart. Such services may or may not have a role for Amtrak, and may have an expanded role for states. Lurking in the future is the dream of magnetic levitation or maglev trains. All face the issue of cost.

This list illustrates the range of visions under discussion. Nothing approaching consensus is apparent—but this is not surprising. The original Interstate program spanned a 20-year gap between conception in the 1930s to full funding in 1956. The debate about a national system of high-speed highways began before World War I.

Yet no comparable vision today seems likely to yield consensus support as the Interstate did. Therefore it is possible that federal leadership, which was essential for the Interstate network and subsequent surface transportation planning, development, and financing, will continue to erode.

## Ominous Prospect

If the Interstate is an exception that cannot be replicated, where does that lead? One dark vision of the future federal surface transportation program may be found in the history of the U.S. Army Corps of Engineers. Founded in 1824, the Corps has a long tradition of fine engineering.

Early on, Congress supported the Corps in the development of a significant system of internal improvements. This also was an exception to our nation's history of deferring to states, localities, and the private sector in the development of infrastructure, but it was short-lived. After only 15 years, Congress cut back support for system-level development and shifted the support to individual projects.

Today, every dollar of the Corps' multibillion dollar civil works budget is earmarked to a specific project by Congress, and many observers preface descriptions of the work with the term "pork barrel." The surface transportation program could fol-

## Websites Commemorating the 50th Anniversary of the Interstate Highway System

### American Association of State Highway and Transportation Officials

<http://interstate50th.org/>

### American Society of Civil Engineers

[www.asce.org/history/monuments\\_millennium/highway.cfm](http://www.asce.org/history/monuments_millennium/highway.cfm)

### American Road and Transportation Builders Association

[www.artba.org/50th/50th.htm](http://www.artba.org/50th/50th.htm)

### Federal Highway Administration

[www.fhwa.dot.gov/interstate/50\\_splash.htm](http://www.fhwa.dot.gov/interstate/50_splash.htm)

[www.fhwa.dot.gov/interstate/homepage.cfm](http://www.fhwa.dot.gov/interstate/homepage.cfm)

### State Departments of Transportation

Colorado—[www.dot.state.co.us/50Anniversary/index.cfm](http://www.dot.state.co.us/50Anniversary/index.cfm)

Florida—[www.fl-interstate.com](http://www.fl-interstate.com)

Georgia—[www.dot.state.ga.us/50th/index.shtml](http://www.dot.state.ga.us/50th/index.shtml)

Illinois—[www.IL50.com](http://www.IL50.com)

Iowa—[www.iowainterstate50th.com/](http://www.iowainterstate50th.com/)

Kansas—[www.ksdot.org/interstate50th/](http://www.ksdot.org/interstate50th/)

Minnesota—[www.dot.state.mn.us/interstate50/](http://www.dot.state.mn.us/interstate50/)

Nebraska—[www.dor.state.ne.us/i-80-anniv/index.htm](http://www.dor.state.ne.us/i-80-anniv/index.htm)

Ohio—[www.dot.state.oh.us/interstate50](http://www.dot.state.oh.us/interstate50)

Oregon—[www.oregon.gov/ODOT/COMM/interstate50.shtml](http://www.oregon.gov/ODOT/COMM/interstate50.shtml)

Rhode Island—[www.dot.state.ri.us/news/50th.htm](http://www.dot.state.ri.us/news/50th.htm)

South Carolina—[www.dot.state.sc.us/getting/50year\\_ann.shtml](http://www.dot.state.sc.us/getting/50year_ann.shtml)

Tennessee—[www.tninterstate50.com/](http://www.tninterstate50.com/)

Texas—[http://tti.tamu.edu/interstate\\_anniversary/](http://tti.tamu.edu/interstate_anniversary/)

Virginia—[www.virginiadot.org/infoservice/100years/interstates.asp](http://www.virginiadot.org/infoservice/100years/interstates.asp)

Wisconsin—[www.dot.wisconsin.gov/library/history/50/](http://www.dot.wisconsin.gov/library/history/50/)

—Compiled by Jessica Fomalont, Assistant Librarian, TRB



High-speed rail (far left, the Eurostar in London's Waterloo station) and maglev trains offer potential alternatives to Interstate expansion.

low the Corps of Engineers model and evolve toward continued project-level focus and legislative earmarking.

That prospect is ominous, but not hopeless. Today's challenging situation provides a valuable opportunity to explore new systems, as well as new institutional and financial arrangements to allow the systems to develop and flourish. To paraphrase the late Peter Drucker, the present is the enemy of the future. Thomas Hughes, the historian of technology, makes the same point: old systems suffocate new ones.

Most readers have observed in their lifetimes how new systems can displace their parent systems. The federal government forced the breakup of AT&T in 1984, paving the way for two decades of extraordinary innovation and development in communications. Where would that industry be today if the AT&T monopoly had remained intact?

## Evolving Features

No one knows how the surface transportation system will evolve. The Interstate system will remain in use for generations, and the public is certain to demand continued renewal. Looking forward, several features appear likely:

◆ **The private sector will play a larger role in financing.** Given the state of the federal budget, the aversion to increasing the gas tax, and problems with the future of the gas tax, federal financing is unlikely to lead the way as it did by providing 90 percent of the financing for the Interstate.

◆ **Future federal support will be influenced increasingly by politics.** Despite calls for an end to earmarking, a return to a system driven by expert planning instead of political control will be difficult.

◆ **Vehicle infrastructure integration will expand.** Significant accomplishments in the area of electronic toll payment already are in place. The institutional issues are formidable, but if these can be addressed, significant system performance increases are possible.

## A Contest of Values

An important lesson of the Interstate is that a thoughtfully engineered system can bestow enormous benefits. Although far from perfect, the Interstate system has made extraordinary contributions to the nation's quality of life. The Interstate is exceptional among the nation's major infrastructure systems in the magnitude of the federal role and in the duration of the federal commitment to building out the system.

No vision as compelling as that of the Interstate has yet emerged. Achieving an Interstate-like consensus—a worthy objective—may not be possible. Limiting the exploration of alternatives to those that require a consensus would be a mistake, leading to more of the same. In this extraordinary time, it is imperative to explore new systems, new institutional and financial arrangements, new roles, and new responsibilities.

Conceiving and realizing the nation's transportation future will be an ongoing contest among often strongly held views about mobility, accessibility, equity, environmental stewardship, economic competitiveness, and resource conservation. This contest is not only about the technical and engineering efficiency of the transportation system—it is about values.

The transportation leaders of the mid-20th century wrestled with these issues and created the vision that brought the Interstate program into being. Today's transportation leaders have an equal obligation to forge a new future. That could be their most important legacy.

## References

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3. Rohatyn, F. G., and W. Rudman. It's Time to Rebuild America: A Plan for Spending More—and Wisely—on Our Decaying Infrastructure. *Washington Post*, December 13, 2005, p. A27.
4. Poole, R. W., Jr. The Emerging Threat to Toll Revenues. *Public Works Financing*, No. 202, February 2006, pp. 23–24.