

November 2008



REPORT

## THE FEDERAL INVESTMENT IN HIGHWAY RESEARCH 2006–2009

### STRENGTHS AND WEAKNESSES

#### Summary

*The nation has 8.4 million lane miles of roads that connect metropolitan areas, towns, and counties to serve more than 300 million residents and 7 million business establishments. Publicly funded highway research programs have developed innovations that have resulted in longer-lived assets at lower costs, reduced environmental impact, saved lives, and improved economic efficiency. Additional innovation will be needed to improve safety, reduce congestion, address environmental and energy concerns, and provide the quality highway system that the nation's citizens expect. To foster this innovation, research funding should be awarded through a process of competition and merit review; advanced research activities should be fostered; past research cuts should be restored and additional funding made available; stakeholder-supported programs should be continued; a robust program for dissemination of research results should be supported; and a process should be established that engages the entire highway community in setting highway research priorities.*

Highway transportation is the principal circulatory system for the national economy. It has contributed to the past few decades of national economic growth but is under severe stress due to heavy demand, aging of a huge capital stock, environmental impact, and shortages of funding to address these problems. The American lifestyle is strongly dependent on highway transportation. Americans use personal vehicles for 87 percent of daily trips and 90 percent of long-distance trips. Moreover, highways are the backbone of the decentralized U.S. economy, whose functioning would be unimaginable without the access highways provide for motor carriers. Truck ton-miles represent about 30 percent of total U.S. ton-miles of freight; more important, that tonnage accounts for nearly 75 percent of the value of all freight shipped.

Public-sector highway research has been the primary source of innovation and insight to meet national needs for highway transportation. Continued innovations to make highways safer, perform better, last longer, and cost less are essential in sustaining the contributions made by highways to national prosperity. Successfully addressing many of the highway system's challenges will require new and more efficient ways of doing things—new materials, better and faster construction techniques, safer designs, better information for drivers, new financing mechanisms, options for pricing the use of the system, and many more. This is the role that research, development, deployment, and training must fill.

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Since 1992, the Research and Technology Coordinating Committee (RTCC) of the Transportation Research Board (TRB) has served as an independent advisor on national and federal highway research. Its work over the past 15 years has been supported by the Federal Highway Administration (FHWA). This report presents the findings and recommendations resulting from RTCC's assessment of the highway research programs funded under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) according to a refined list of the principles for research articulated by Congress in the preamble to the research title (Title V) (see box on facing page), as well as additional principles the committee believes to be important in sustaining a vital highway research program.

## MAIN FINDINGS

Despite the progress made in overall funding under SAFETEA-LU, highway research programs are significantly underfunded in comparison with the level of investment in industry. Public and private highway research is funded at only about one-quarter of the level of industrial research and development in the United States (highway RD&T represents only 0.9 percent of revenues provided to highway agencies, whereas industrial investment in RD&T is equivalent to 3.3 percent of revenues earned from sales).

Extensive earmarking (62 percent) of the Title V University Transportation Centers (UTC) program and additional earmarks scattered across FHWA programs (equal to at least 18 percent of FHWA's funding) violate the SAFETEA-LU principle of awarding research funds on the basis of competition and merit review.

The programs funded under SAFETEA-LU do not include all the content areas Congress requested. Because of funding constraints in Title V, FHWA was forced to cut important areas of research in safety, operations, planning and environment, and policy. Funding for research and data collection to support policy decisions was eliminated, and funding for planning was greatly reduced. Although funding is provided

in certain other areas, such as deployment and technology transfer, it is at levels that are inadequate to the task.

The 50-50 matching requirement for the UTC program biases this program toward highly applied research and away from advanced research, which is one of the main rationales for having a university research program.

Because of funding constraints, FHWA has inadequate funds to follow through on commitments made in its Corporate Master Plan for Research and Technology to engage stakeholders more broadly in agenda setting, merit review, and program evaluation.

The Strategic Highway Research Program (SHRP) 2 adheres to all the research principles of Title V, but it is funded at only 36 percent of the level and for 2 years less than stakeholders requested. The downscaled program will not be able to meet all the goals originally envisioned.

## RECOMMENDATIONS

### Principles for Research

To the maximum extent practicable, funding should be awarded for research on the basis of the principle of competition and merit review. Sole-source funding should be allowed for in the relatively rare circumstances where it is appropriate, such as when only a single agency has the capability required.

All UTC funds should be awarded to universities competitively. The 50-50 matching requirement for UTC research should be reduced to a 20 percent university match to allow universities to conduct more advanced research. Competition should be open to all universities and should not be limited by prior levels of transportation research activity.

### Funding

FHWA should be provided the resources it needs to deliver on the commitments made in its Corporate Master Plan to involve stakeholders more substantively in its RD&T program, specifically in agenda setting, merit review, and peer review.

FHWA should be provided more funding for mission-related activities, such as program support for regulations and oversight, technical

## Principles for Research Based on Title V, SAFETEA-LU

1. The federal portfolio should cover the full innovation cycle, including the following:
  - a. Agenda setting,
  - b. Conduct of research,
  - c. Support of research and technology transfer by the states,
  - d. Sharing of results, and
  - e. Deployment (including education and training).
2. Justification for federal investment requires that
  - a. Activities be of national significance,
  - b. There be public benefit and suboptimal private investment,
  - c. Efficient use of federal funds by states and local governments be encouraged, or
  - d. The activity be the best means to support federal objectives.
3. The content of the federal research, development, and technology (RD&T) program includes the following:
  - a. Fundamental, long-term research;
  - b. The filling of significant gaps; and
  - c. Policy or planning.
4. Stakeholder input is addressed.
5. Awards are almost always made on the basis of competition and merit review.
6. Programs include performance review and evaluation.

NOTE: This list represents a distillation of eight principles included in Title V to combine two principles that overlap and eliminate one that is not relevant to this report.

assistance, information sharing, technical exchange, and other deployment activities. Funding for many program areas significantly cut back in SAFETEA-LU, including operations, safety, and environmental research, should be restored. Funding for policy research should be restored and expanded to meet pressing national needs.

FHWA should be given resources for stakeholder technical assistance and deployment activities in the planning and environmental area that it formerly had under the Transportation Equity Act for the 21st Century.

Specific programs supported by stakeholders require additional attention. RTCC recommends that

- Congress consider extending the SHRP 2 program for 2 years of the next authorization and funding it under Title I, as states have requested;<sup>1</sup>
- The Long-Term Pavement Performance Program be funded to complete the data collection required for the experiment, fund the analysis needed to realize the benefit of the investment, and preserve the massive database on pavement performance collected under the program;
- The Long-Term Bridge Performance Program and other programs with broad-based stakeholder support authorized in SAFETEA-LU be reauthorized;

<sup>1</sup> RTCC endorsed the funding of the SHRP 2 program in its 2001 report, *The Federal Role in Highway Research and Technology*. The program was subsequently authorized in SAFETEA-LU, and TRB was asked to manage the program. The committee believes that the program meets all the principles of research laid out in SAFETEA-LU. The program received much less funding and time than were requested and therefore is a candidate for continued funding. Even so, the committee does not wish to be perceived to be recommending future work for TRB to manage. Thus the committee's recommendation urges Congress to consider funding an extension of the program on its merits.

- The surface transportation environmental research program supported by stakeholders be authorized as a cooperative research program as recommended in TRB's 2002 report, *Surface Transportation Environmental Research: A Long-Term Strategy*; and
- Funding for research programs to improve travel forecasting models and practice be authorized as recommended in TRB's 2007 report, *Metropolitan Travel Forecasting: Current Practice and Future Direction*.

### Data Collection

Greater emphasis on data collection is necessary. The ability to answer many of the most important policy questions in highway transportation requires much better data. Research and better data are also needed in the planning area to develop the advanced modeling tools needed to meet federal and local planning and environmental mandates.

States and metropolitan planning organizations rely heavily on the National Household Transportation Survey; that survey was dropped by the Bureau of Transportation Statistics (BTS), whose funding was also sharply reduced by SAFETEA-LU. Similarly, better and more timely data on freight

movements are essential for improved planning. The Commodity Flow Survey, which is still part of BTS's portfolio, should be sustained and enhanced to meet user requirements.

### Agenda Setting

Establishment of communitywide consensus on national highway research priorities would help focus all highway research programs on the most important areas. FHWA should be given the resources to take the lead in establishing an ongoing process whereby the highway community can set these priorities.

## CONCLUDING OBSERVATION

Even within current constraints, the federal investment in highway research is sound. Publicly funded highway research programs have developed innovations that have resulted in longer-lived assets at lower costs, reduced environmental impact, saved lives, and improved economic efficiency. Adoption of the above recommendations would provide the nation with an improved program that would yield even greater dividends. These additional payoffs from research are urgently needed to meet the demands being placed on the highway system today and into the future.

**Research and Technology Coordinating Committee (FHWA):** E. Dean Carlson, Carlson Associates, Topeka, Kansas, *Chair*; Frances T. Banerjee, Banerjee and Associates, San Marino, California; John Conrad, Washington State Department of Transportation (ret.),\* Olympia; Arthur Dinitz, Transpo-Industries, Inc., New Rochelle, New York; Daniel C. Murray, American Transportation Research Institute, Minneapolis, Minnesota; Timothy Neuman, CH2M Hill, Chicago, Illinois; Lawrence H. Orcutt, California Department of Transportation, Sacramento; Leonard A. Sanderson, Parsons Brinckerhoff, Raleigh, North Carolina; Constance S. Sorrell, Virginia Department of Transportation, Richmond; Les Sterman, East-West Gateway Council of Governments, St. Louis, Missouri; Joseph M. Sussman, Massachusetts Institute of Technology, Cambridge; Albert H. Teich, American Association for the Advancement of Science, Washington, D.C.; Paul Wells, New York State Department of Transportation (ret.), Albany; Kevin Womack, Utah State University, Logan

\* During the first 5½ years of his term, Conrad was with the Washington State Department of Transportation. After retiring in 2008, he joined CH2M Hill.

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