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Federal Highway Research, Development and Technology Deployment Program and Reauthorization Legislation

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Summary

Debate over the future of federal support for highway research and development (RD) and technology deployment (TD) is part of the broader debate over reauthorization of federal policy regarding highway and transit programs. This report discusses the scope and nature of the RD and TD program of the Federal Highway Administration (FHWA) and surveys issues associated with its reauthorization. Federal funding for RD and TD is authorized through FY2003 and proposed for the first five months of FY2004 by extension legislation, e.g., H.R. 3087. In the Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2003 (SAFETEA), introduced, by request, as H.R. 2088 and S. 1072, the Administration proposes to change some aspects of the existing RD and TD program, but would, on the whole, continue many of the same types of activities at a higher funding level in the aggregate than that provided in TEA21. This report will not be updated.

Background

Federal support for highway RD as well as TD activities is authorized by the Transportation Equity Act for the 21st Century (TEA21), P.L. 105-178, as amended by Title IX of P.L. 105-206. This funding for RD and TD is authorized through FY2003 and extension legislation has passed the House (H.R. 3087) and is under consideration in the Senate. Using these funds, the FHWA seeks to advance the state of knowledge and practice in a wide array of areas, including highway safety, traffic operations, bridge stability, and issues associated with the financial stability of the Federal Highway Trust Fund. The federal investment also supports related training and technical assistance provided to state and local governmental employees and research conducted by universities.

In the Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2003 (SAFETEA), introduced, by request, as H.R. 2088 and S. 1072, the Administration proposes to change some aspects of the existing RD and TD program, but would, on the

whole, continue many of the same types of activities at a higher funding level in the aggregate than that provided in TEA21. The congressional committees of jurisdiction have not yet introduced their reauthorization proposals.

Many of those participating in the debate over reauthorization are exploring ways to: increase stakeholder involvement throughout the highway RD and TD process, improve the measurement of the results from this investment, strengthen strategic planning to guide innovation, maximize the allocation of funds for various RD and TD activities, specify research objectives to be pursued with these funds, and find an appropriate balance between federal support for advanced versus applied research.

Scope and Nature of the Federal Highway RD and TD Program

RD and TD play a role in helping to address the various challenges that affect the efficiency or operation of the Nation's highway system. These challenges include: reducing traffic congestion, promoting security of infrastructure, reducing fatalities and injuries due to traffic crashes, preserving environmental quality during highway construction, and rehabilitating the system. The federal role in highway RD and TD seeks to advance and accelerate the use of improved or safer technologies, processes, policies, vehicles, and infrastructure to address these challenges. These activities are primarily conducted or administered by the FHWA, Federal Transit Administration, National Highway Traffic Safety Administration, Research and Special Programs Administration, and Federal Motor Carrier Safety Administration–each modal administrations within the Department of Transportation. This report deals exclusively with FHWA's RD and TD program, which is the largest of those listed.

FHWA conducts primarily an applied RD and TD program that involves all aspects of the highway system, focusing on highway safety, policy, structures, asset management, operations, environment, and planning. (Activities related to the security or protection of the highway infrastructure are integrated with other core efforts.) FHWA uses RD and TD funds for many diverse purposes: to conduct applied research to solve particular materials or engineering problems of concern to one or more states, develop new or improved methods of building roads and bridges, prepare policy-oriented reports required by Congress, and provide manuals on best practices in various technical fields.

Monies from the Federal Highway Trust Fund that are invested in the RD and TD pipeline frequently pay off with substantial benefits. The successful outputs or results of FHWA's highway RD and TD program often assist state and local highway agencies, or the highway construction and signage industry. Cost efficient use of federal aid funds may be facilitated by the application of various improved technologies–e.g., those that provide for longer lasting pavements, detect flaws in bridges with advanced technologies before these defects result in catastrophic events, and deploy improved engineering designs and safety features on the highway system. When the output improves the performance or safety of the surface transportation system, this investment, in general, also benefits the highway user.

On the other hand, sometimes the products of federally-sponsored research are not used widely by state and local transportation agencies, and thus, there remains a gap

between the state of knowledge and the state of practice.[1] Indeed as the Transportation Research Board points out certain characteristics of the highway industry and the public sector act as barriers to innovation and change.[2] Nevertheless, many state and local transportation officials assert that FHWA's RD and TD program is of fundamental importance to their missions and agencies.

To fund the FHWA RD and TD program, Title V of TEA21 authorizes roughly $200 million per year for FY1998-FY2003. For example, for FY2003 these RD and TD funds are authorized in the following amounts: $103 million for the Surface Transportation Research Program, $50 million for TD, $20 million for training and education, and $26.5 million for University Transportation Centers. (For FY2004 for these activities, the House approved in H.R. 2989 and the Senate Committee on Appropriations recommended in S. 1589 amounts similar to those authorized for FY2003.) Section 5102 of TEA21 specifies a broad array of research objectives and purposes for the Surface Transportation Research Program, which provides working capital for more than 300 FHWA employees who manage or conduct projects pertaining to research and technology.[3] Section 5102 also authorizes an advanced research program to address longer-term, higher-risk research that shows potential for improving highway and intermodal transportation systems.[4] In addition, TEA21 authorizes funding for specific research activities. For example, sections 5001(c)(1)(A) and 5102 specify authority for the Long Term Pavement Performance (LTPP) program at $10 million per year for FYs 1998-2003. This investment yields information, analysis procedures, and guidelines on pavement monitoring, design, and materials testing.

Other major components of FHWA's highway RD and TD program include the Technology Deployment (Section 5103) and Training and Education (Section 5104)

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[1] The challenge is to promote the widespread use of improved technologies in numerous applications. To promote the use of research results and products, FHWA uses a variety of strategies to conduct technology transfer activities, such as by deploying mobile vans to demonstrate new technologies to state and local highway agencies, presenting professional development courses, offering web access to recent information, and supporting peer to peer technical advisors.

[2] Transportation Research Board. The Federal Role in Highway Research and Technology. Special Report 261. 2001. pp. 36-37. These include: constraints of public-sector procurement practices, conflicting public- and private-sector incentives, and low tolerance for risk in the public sector.

[3] The program supports work on materials, methods, and testing to improve the durability of surface transportation infrastructure; technologies to reduce cost and minimize disruption due to construction activities; non-destructive evaluation equipment (e.g., using various technologies to "peer" inside of bridges looking for defects); and highway geometrics, structures, and vehicle size and weight standards. See [http://www.fhwa.dot.gov/tea21/factsheets/r&t.htm]

[4] The Transportation Research Board report cited in footnote #2 recommended substantially increased federal support for advanced highway research, which has been funded at about $800,000 during the years covered by TEA21, except for FY2002 when this activity was funded at about $2.4 million.

efforts.[5] [6] According to FHWA, 70% of the FY2003 technology deployment funds are earmarked for specific types of research or projects.

Reauthorization Proposals and Issues Under Consideration

Administration's Proposal. As shown in **Table 1**, in SAFETEA, the Administration is proposing increased funding for highway RD and TD activities. Because activities funded under TEA21 and SAFETEA would differ somewhat, an exact comparison of funding levels is not possible. But roughly speaking, the proposed FY2004 funding amount of $257.5 million represents about a 26% increase over the FY2003 appropriated amount of $205.5 million. The SAFETEA bill combines RD funds with TD funds into a proposed Surface Transportation Research, Development and Deployment Program, which is intended to advance innovation in such areas as transportation infrastructure, services, and operations. The proposed RD and TD program in SAFETEA, is similar in many respects to the current program conducted by FHWA under TEA21. However, under SAFETEA FHWA intends to place more emphasis on support of "...fundamental, long-term highway research; research aimed at significant highway research gaps, and emerging issues with national implications, and research related to policy and planning."[7] Whether the agency would be able to accomplish a significant shift remains uncertain. Although FHWA was authorized to conduct advanced research under TEA21, this objective was difficult to accomplish because of earmarking of funds and the use of funds to meet shorter mission-oriented goals. SAFETEA proposes other changes from the authorities specified in TEA21. For example, SAFETEA includes a statement on the importance of stakeholder input into R&D activities and planning; a legislative requirement to operate the Turner-Fairbank Highway Research Center; and increased attention to security processes and terrorist countermeasures.[8]

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[5] Section 5103 authorizes funding for an assortment of diverse deployment and training activities, including the Technology Deployment Initiatives and Partnerships Program (TDIPP), which focuses on various technology deployment goals determined by the Secretary to be able to produce tangible national benefits; and the Innovative Bridge Research and Construction Program, which is intended to demonstrate the applications of innovative materials in the repair, rehabilitation, replacement and construction of various structures.

[6] Authority is specified in Section 5104 for the Local Technical Assistance Program ($10 million in FY2003), which provides technical assistance and training to state and local highway agencies, the National Highway Institute ($8 million in FY2003), which develops and provides training courses on numerous highway-related areas, and the Eisenhower Transportation Fellowship Program ($2 million in FY2003), which helps pay primarily for graduate students to pursue studies related to transportation.

[7] Title V , see Section 5101of SAFETEA

[8] The Administration's proposal (Section 5205) would continue funding for the National Highway Institute and the Local Technical Assistance Program, although specific funding amounts for each effort are not specified. In Section 5301 the Administration seeks to convert the existing University Transportation Centers program into one that requires the universities receiving funds to enter into a cooperative partnership with at least one private sector organization and at least one (non-federal) government public sector entity. Section 5202 of SAFETEA proposes funding to support the Surface Transportation Environment and Planning Cooperative Research Program, which would be intended to examine links or impacts among

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Table 1. SAFETEA Highway RD and TD Funding Proposal

Program Activity	TEA21 FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009
Surface Transportation Research, Development and Deployment Program	$153M	$199M	$199M	$199M	$199M	$199M	$199M
Training and Education	$20M	$26M	$26M	$26M	$26M	$26M	$26M
University Transportation Research Program[9]	$32.5M	$32.5M	$32.5M	$32.5M	$32.5M	$32.5M	$32.5M

Source: Safe, Accountable, Flexible and Efficient Transportation Equity Act of 2003, Title V, M= million.

Various hearings and discussions have surfaced many issues and requests that are being vetted during the reauthorization process. These pertain to:

Funding Levels and Objectives for Different RD and TD Activities. Congress is considering how much money to authorize for FHWA's core RD and TD activities, and which technological or training objectives might receive emphasis or dedicated funding. Many groups maintain that federally-supported highway RD and TD has been substantially underfunded, and these activities need to be bolstered to meet future technological opportunities.[10] The American Association of State Highway and Transportation Officials supports an increase in funding of about $100 million for FHWA's core surface transportation R&T program (including training and education), authorized at roughly $205.5 million for FY2003. Some other groups are proposing even higher amounts. Some are proposing funding for previously unfunded programs, such as the Surface Transportation Environmental Cooperative Research Program (which was authorized in TEA21 but not explicitly funded), or a new cooperative program in freight research. Requests to increase RT funding, however, are surfacing at a time when the financial condition of the Highway Trust Fund is subject to much uncertainty and when there are numerous demands to help improve infrastructure. Indeed, competition for RD and TD funds is expected to be intense.

Management Issues and Earmarking Concerns. Congress also is considering ways to strengthen and improve the management and implementation of FHWA-sponsored RD and TD activities. Some of the challenges or concerns that have been raised include: how to increase and improve stakeholder input in the innovation process, ways to foster more effective technology transfer of new innovations to state and

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[8] (...continued)
transportation activities and human health, the ecology, and land use.

[9] $26.5 million from the Highway Account and $6.0 M from the Mass Transit Account.

[10] Some areas of federal R&D investment, such as the budget for the National Institutes of Health and the National Science Foundation, have enjoyed substantial increases in funding during the last five years. This is not the case with respect to FHWA's RD and TD budget.

local highway agencies, and methods to improve the coordination of a diverse RD and TD program, within a decentralized and diverse community.[11]

Many are concerned over the extent of earmarking that has occurred with these funds. The GAO found that between 44% and 48% of authorized surface transportation RD and TD funds were designated in FY2000 through FY2002. As part of the reauthorization process, Congress will be considering many requests to increase the number of University Transportation Centers and other requests for designated funding. When overseeing projects that have received earmarked funds, FHWA does not have the same leverage to influence the research process as it does when it competitively chooses the performer of the research. It is likely to continue to be a challenge to integrate numerous earmarked projects into the broader context of a coordinated national highway RD and TD program. Many researchers want essentially all proposals to be bid on competitively.[12] Some believe that the multiple participants in the RD and TD process together with the impact of earmarks has undermined FHWA's ability to carry out a multi-year strategic RD plan.[13] On the other hand, many Members believe it is appropriate to petition on behalf of their constituents for support of specific activities.

Mission and Performance. Some maintain that FHWA should focus on broad, fundamental, high risk/high payoff research that will address transportation issues with a 5 to 20 year time frame.[14] Some note that although much of its research is near-term, mission oriented, DOT does provide some limited funds for longer-term research objectives.[15] Given limited dollars there also is much interest in maximizing the usefulness of research. The GAO concluded that FHWA does not have a systematic method that incorporates peer review for evaluating research outcomes.[16] FHWA has held workshops with numerous stakeholders to generate ideas for improving its management /implementation of RD and TD, and that agency has issued a plan on how it intends to improve stakeholder involvement in its RD and TD program and make other changes in the program. The results of implementing this plan are likely to be reviewed by various oversight bodies, including FHWA's leadership, the Transportation Research Board, and various congressional committees.

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[11] Reports by the Transportation Research Board and the General Accounting Office have urged increased stakeholder involvement in various aspects of FHWA's RD and TD program.

[12] There may be some research-related activities where a specific organization has unique capabilities that are required to accomplish specific objectives.

[13] See [http://www.house.gov/science/hearings/ets03/apr10/charter.htm] for a discussion of this issue.

[14] For example, see statement of Eric E. Harm, Illinois Department of Transportation, before the Subcommittee on Environment, Technology, and Standards, House Committee on Science, April 10, 2003.

[15] Statement of Emil Frankel, U.S. Department of Transportation, before the Subcommittee on Environment, Technology, and Standards, House Committee on Science, April 10, 2003.

[16] Statement of Katherine Siggerud, General Accounting Office, before the Subcommittee on Environment, Technology and Standards, House Committee on Science, April 10, 2003.