

ISTEA: Revitalizing Surface Transportation Research and Technology Programs

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The nation's highway program will be shaped significantly for the remainder of this century and beyond by the six-year Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). Consequently, the future of research and technology (R&T) programs of the Federal Highway Administration (FHWA) will be shaped significantly as well.

For many years the highway research and technology programs of the United States appeared to be funded at modest and relatively constant levels. In reality, however, funding for the programs was decreasing because of inflation. Some agencies reduced the size of their R&T programs, which included a reduction in the number of staff.

Support for highway R&T programs took a turn for the better with the enactment of the Surface Transportation Assistance Act of 1987, which provided for the Strategic Highway Research Program (SHRP). SHRP received an influx of funds for highway research and development that had been limited by insufficient resources.

ISTEA will provide the FHWA R&T programs with greater visibility and resources, strong support for intelligent vehicle-

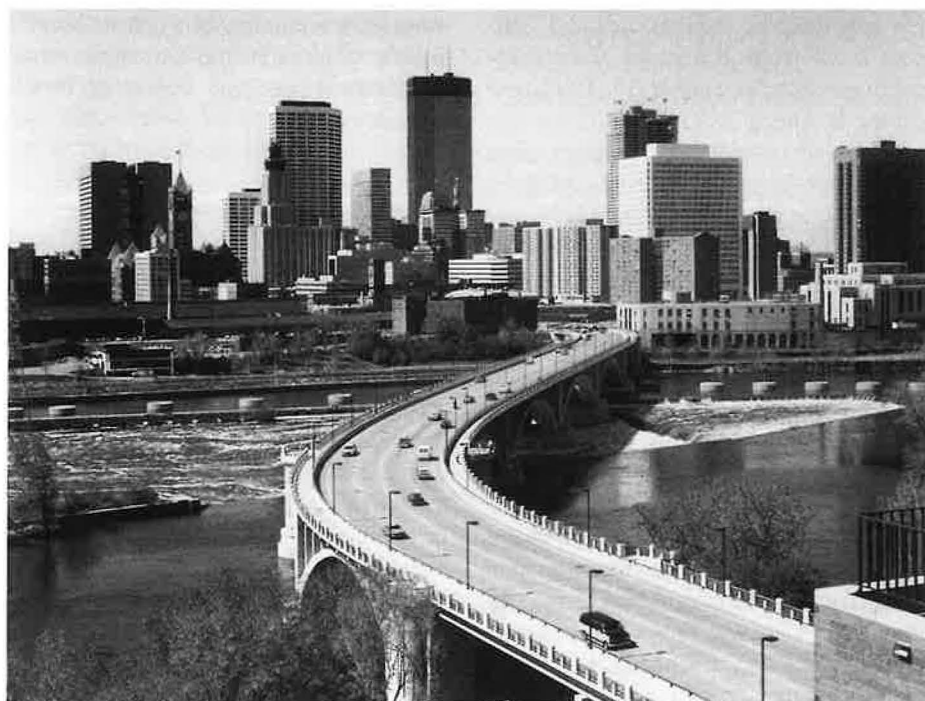
highway systems (IVHS), collaborative research, emphasis on commercial motor vehicle safety, international outreach, and expanded education and training programs.

Through the passage and signing of ISTEA, Congress and the President demonstrated their support for research and technology.

Program Visibility and Development

The act mandates that certain studies be undertaken in economic highway geometrics and structures and in vehicle size and weight standards. Researchers will identify and measure both quantitatively and qualitatively the factors that relate to the economic, social, and environmental impacts of highways. These factors include the development of performance indicators for the nation's surface transportation system, implementation of the results of SHRP research, and expansion of surface transportation infrastructure research and development.

The act provides for the establishment of the National Council on Surface Transporta-



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FHWA

Aftermath of Loma Prieta earthquake. Seismic Research Program will continue to address strength of nation's infrastructure.

tion Research, which will investigate current surface transportation research and technology developments in the United States and abroad. The council will identify gaps and duplication in current surface transportation research efforts and determine areas for research and development that may result in increased efficiency, productivity, safety, and durability in the nation's surface transportation systems. The council will be composed of seven members appointed by the President and Congress. It will report the results of the study to Congress by September 30, 1993, and disband by March 30, 1994.

The act also establishes the independent Surface Transportation Research Advisory Committee to provide ongoing advice and recommendations to the Secretary of Transportation on surface transportation research and development. The secretary will appoint the committee's 20 to 30 members, who will include representatives from universities, corporations, associations, consumers, state government agencies, and federal agencies other than the U.S. Department of Transportation (DOT).

The act requires establishment of an integrated National Surface Transportation Research and Development Plan by the secretary. The plan will provide appropriate funding levels and a schedule with milestones, preliminary cost estimates, work

plans, personnel requirements, and estimated costs and goals for the next three years for each area of research and development. The plan will also include a 10-year projection of long-term research and development.

The application of research results from all sources is also emphasized in the act: technology transfer is highlighted as a function to be performed; SHRP products are singled out for specific attention. The act provides a minimum of \$108 million for product implementation and continuation of SHRP's Long-Term Pavement Performance Program.

Intelligent Vehicle-Highway Systems

The act establishes an IVHS program with approximately \$660 million for the six-year authorization period. The program will include research, development, and operational tests of innovations and technologies that, as a component of the nation's surface transportation system, will enhance its mobility, efficiency, and safety. The act also establishes goals to use the systems where they will help improve air quality; develop and promote an IVHS industry; reduce the societal, economic, and environmental costs of traffic congestion; enhance indus-

trial and economic competitiveness and productivity; develop a technology base and establish the capability to perform demonstration experiments at national laboratories; and transfer the technology to the private sector. The act directs the U.S. DOT and other interested federal departments and agencies to strive for maximum involvement by the U.S. private sector, universities, and state and local governments.

DOT is also directed to develop and implement standards and protocols that will ensure compatibility in the implementation of IVHS technologies. Further, the act requires evaluation guidelines for IVHS operational tests and the establishment of an information clearinghouse.

Within the first year of the act, the department will develop and implement a strategic plan for IVHS and submit it to Congress. The plan must include the goals, objectives, and milestones of the IVHS program and will provide for accelerated use of advanced technology to reduce traffic congestion.

The act also requires development of a completely automated highway and vehicle system, which will serve as the prototype for future fully automated IVHS systems. The goal is to have the first roadway or test track in operation by the end of 1997. The IVHS Corridors Program will be established to provide for operational tests under actual traffic conditions. Corridors that meet certain transportation and environmental criteria can participate in development and implementation of IVHS technologies.

Other provisions related to IVHS include the use of advisory committees to carry out the IVHS program and planning grants to state and local governments to study the feasibility of development and implementation of IVHS.

Applied Research and Technology and Seismic Research Programs

The new Applied Research and Technology Program is mandated to provide accelerated testing, evaluation, and implementation of technologies designed to improve the durability, efficiency, environmental impact, productivity, and safety of highway,

transit, and intermodal transportation systems. The Secretary of Transportation is required to provide program guidelines within 18 months, and a total of \$240 million is authorized for the six years of the act.

The Seismic Research Program will be established to study the vulnerability to earthquakes of the highways, tunnels, and bridges of the Federal-aid system and to implement cost-effective methods to reduce such vulnerability. The work will be carried out in cooperation with the National Center for Earthquake Engineering Research and agencies participating in the National Hazards Reduction Program.

Collaborative Research

Within the highway community, substantial support has been demonstrated for additional research and development and the effective application of innovative technologies to solve highway problems: An important provision that supports this initiative is

new authority for collaborative research and development with other public and private entities, with a federal share of up to 50 percent of the activity costs. The IVHS program has already released requests for proposals that suggest establishing consortiums with public and private institutions to share costs and implement R&T projects.

Commercial Motor Vehicle Safety Technology

In the area of motor carrier research, ISTEA directs the Secretary of Transportation to evaluate technology designed for installation in commercial motor vehicles. This technology will provide the vehicle operator with a warning if a turn, lane change, or other operator movement will place the vehicle in the path of an adjacent object or vehicle. The secretary will submit the report from the evaluation to Congress no later than December 18, 1993.

International Highway Transportation Outreach Program

The new International Highway Transportation Outreach Program will inform the U.S. highway community of foreign transportation innovations. The program will also promote U.S. highway transportation expertise internationally and increase the use of U.S. technology in other countries.

National Highway Institute

Under the new act, the National Highway Institute (NHI), in cooperation with state transportation departments, will expand state education and training programs related to highways to include not only federal, state, and local highway agencies, but also U.S. citizens from the private sector and foreign nationals involved in highway work of interest to the United States. The act sets aside $\frac{1}{16}$ of 1 percent of all funds for the surface transportation program provided to a state for payment of up to 80 percent of the cost of training and educa-

tion for state and local highway employees, excluding travel, subsistence, and salaries. NHI will develop and present a wide range of education and training programs related to highways on planning, environmental factors, acquisition of rights-of-way, relocation assistance, engineering, safety, construction, maintenance, contract administration, motor carrier activities, and inspection. Assessing and collecting fees to defray the cost of developing and administering education and training programs will continue. Fees for private agencies and individuals will reflect the full cost of the education and training received; others are to be assessed a reduced amount. In addition, the act authorizes NHI to grant training fellowships.

Education and Training

The act establishes an education and training function that continues and expands the existing Rural Technical Assistance Program (RTAP). The new program may include urban areas with populations of up to one million and Native American tribal governments, as well as rural areas already covered by RTAP. The program is authorized at \$6 million per year for fiscal years 1992 through 1997, and grants and contracts, as appropriate, may be used to implement provisions of the act.

The expanded program authorizes activities to provide modern roadway technology to highway and transportation agencies in the identified local units of government. The programs may include education and training, technical assistance, and related support services to help expand road and transportation expertise at the local level. Training materials, manuals, and other resource materials, as well as a technical assistance program on tourism and recreational travel, are to be developed and provided.

Technology transfer centers, through which education and training, technical materials, and assistance are provided to local governments, may be established through cooperative agreements with state transportation or highway departments and universities. At least two of the established



Commercial vehicle safety is a key component of new legislation.

centers will be designated to provide Native American tribal governments with training on intergovernmental transportation planning and project selection, and on the use of tourism and recreational travel for economic development purposes. The Secretary of the U.S. Department of the Interior is authorized to participate in these activities.

University Transportation Centers Program and Research Institutes

The act establishes five additional centers under the University Transportation Centers Program and creates five University Research Institutes. Work at the National Center for Transportation Management, Research, and Development at Morgan State University will be focused on research, training, and technology transfer to encourage highly skilled minorities and women to enter the transportation work force.

Through the use of transportation management systems, the Center for Transportation and Industrial Productivity at the New Jersey Institute of Technology will conduct research and development to increase surface transportation capacity and reduce congestion and costs for transportation system users and providers.

Work at the James and Marlene Howard Transportation Information Center at Monmouth College in New Jersey will be coordinated

on transportation-related instruction and research in computer science, electronic engineering, mathematics, and software engineering with the Center for Transportation and Industrial Productivity at the New Jersey Institute of Technology.

The National Rural Transportation Study Center at the University of Arkansas will conduct research, training, and technology transfer activities in the development, management, and operations of intermodal transportation systems in rural areas.

The National Center for Advanced Transportation Technology at the University of Idaho, operating in partnership with private industry, will conduct industry-driven research and development activities focused on transportation-related manufacturing and engineering processes, materials, and equipment.

The five University Research Institutes provided for in the act include the Institute for National Surface Transportation Policy Studies, the Infrastructure Technology Institute, the Urban Transit Institute, the Institute for Intelligent Vehicle-Highway Concepts, and the Institute for Research and Education. Each will specialize in an aspect of transportation research vital to the advancement of U.S. technology and innovation.

Policy-Oriented Research

The act directs the Federal-aid program toward development of a truly intermodal perspective and assessment of the program in terms of performance-based criteria. Accomplishment of these two goals will be supported by products of the R&T programs.

For example, the act specifies that research include studies to identify and measure factors that relate to economic, social, environmental, and other impacts of highway projects. Further, a coordinated long-term research program is mandated for system performance measures, including indicators for productivity, efficiency, energy use, air quality, congestion, safety, maintenance, and other factors. Thus, practical research in these areas will be expanded.

Also highlighted in the act is the serious deficiency in the availability and quality of data to support national transportation policy making across the modes. The act provides for creation of the Bureau of Transportation Statistics to enhance data collection, analysis, and reporting and to ensure the most cost-effective use of resources. This effort contains a significant research element that FHWA will continue to support during and throughout the transition period.

Summary

The Intermodal Surface Transportation Efficiency Act of 1991 will significantly shape the future of the FHWA R&T program in four ways.

First, the act will give the program visibility and foster development by establishing the National Council on Surface Transportation Research to investigate current surface transportation research and technology in the United States and internationally. In addition, an independent Research Advisory Committee will be created and an integrated National Surface Transportation Research and Development Plan will be established.

Second, the act provides for and funds an IVHS program with approximately \$660 million. The act requires compatible standards and protocols to promote widespread IVHS technologies and establishes IVHS evaluation guidelines for operational tests and an information clearinghouse. In addition, the program will develop an automated highway and vehicle system by the end of 1997 as the prototype for future IVHS highways. The IVHS Corridors Program will provide operational tests under actual traffic conditions. The IVHS program has authority to use advisory committees for implementation and has planning grants for state and local governments to study the feasibility and implementation of IVHS. The IVHS program directs DOT and other federal agencies to seek involvement with the U.S. private sector, universities, and state and local governments. A commercial motor vehicle safety technology study also will be conducted.

continued on page 34



Graduate research fellow at work in Turner-Fairbank Highway Research Center Hydraulics Laboratory.

Human Factors Research Program for Highway Safety

Under agreement with the Federal Highway Administration, three TRB committees, Vehicle User Characteristics (A3B02), Simulation and Measurement of Vehicle and Operator Performance (A3B06), and User Information Systems (A3B08), co-sponsored a conference in April at the National Academy of Sciences in Washington, D.C.

The purpose of the conference was to develop a national research program to ad-

dress driver-related problems in highway safety. Patricia F. Waller, Director of the Transportation Research Institute at the University of Michigan, chaired and moderated the conference.

Speakers presented papers on research in three major highway areas: (a) traffic control devices (Robert Dewar), (b) highway design (Charles V. Zegeer), and (c) highway capacity and operations (H. Douglas Robertson). Kenneth L. Campbell

presented a paper in which he described recent accident typology research and findings. In four sessions on major crash types, led by Alison Smiley, Thomas H. Rockwell, Rodger J. Koppa, and R. Wade Allen, topics for human factors research needed to improve highway safety and efficiency were identified and ranked. Some 200 research topics were developed that are expected to be compiled in a Transportation Research Circular in fall 1992.

ISTEA continued from page 6

Third, ISTEA authorizes collaborative research and development with other public and private entities to improve, implement, and share the costs of research, development, and technology transfer projects.

Fourth, the act creates the following programs: the new International Highway Transportation Outreach Program to inform the United States highway community of foreign transportation innovations; the Education and Training Program, which expands RTAP to urban areas with populations of 50,000 to 1,000,000 and includes Native Americans in the program; the Applied Research and Technology Program to accelerate testing, evaluation, and implementation of technologies designed to improve the structure and safety of highway, transit, and intermodal transportation systems; the Seismic Research Program to study the vulnerability to earthquakes of the highways, bridges, and tunnels of the Federal-aid system; the Bureau of Transportation Statistics to ensure the most cost-effective use of transportation monitoring resources; the National Transit Institute to provide training in Federal-aid transit work; and five additional University Transportation Centers and University Research Institutes. In addition, the act broadens the NHI program to include not only federal, state, and local highway agencies but expanded training programs and participation by citizens from the private sector and from other countries.

PROFILES

Humphrey continued from page 28

public agencies who fund and benefit from university programs must be more willing to tap into these enormous resources. One of my greatest challenges is to meet those collective needs."

Humphrey earned a B.S. in civil engineering from Worcester Polytechnic Institute in 1959, and an M.S. in civil engineering from the University of Massachusetts in 1960. He also attended the Cornell Graduate School of Business administration as a nondegree candidate from 1966 to 1967.

Starting his professional transportation career in 1960 with the Bureau of Public Roads (now FHWA), Humphrey also spent two years in the Office of Planning and Program Review in the U.S. Department of Transportation's Office of the Secretary. He returned to Massachusetts and in 1972 became the Director of Transportation, Planning and Programming for the Massachusetts DOT. He was also a partner in forming a private sector transportation consulting firm before joining MIT. He was elected President of the Council of University Transportation Centers in June 1992.

Humphrey has a history of active participation in the Transportation Research Board. At present he is Chairman of Section A—Management and Administration, and serves as a member of the Group 1 Council and of the committees on Transportation Programming, Planning, and Systems Evaluation (former Chairman) and on Statewide Multimodal Transportation Planning. He is also a member of the newly established Research and Technology

Coordinating Committee (FHWA).

In addition to his committee work, Humphrey has been involved in planning and leading a number of DOT, TRB, and FHWA workshops and conferences, including the Williamsburg Conference on Issues in Statewide Transportation Planning (1974), Airlie House Conference on Statewide Transportation Planning (1979), and TRB conferences on Highway Programming (1981 and 1982).

Humphrey was named 1990 Transportation Engineer of the Year by the New England Section of the Institute of Transportation Engineers. He is the author of numerous articles and publications produced by TRB, ITE, and other professional organizations.

Espy continued from page 29

and new universities in its national research efforts," and believes that there is still more to be done.

A graduate of Auburn University, Espy received a master's degree in civil engineering from the Georgia Institute of Technology. His professional activities include membership of AASHTO's committees on policy, highways, and metrication, and the Permanent International Association of Road Congresses (PIARC).